Promoting research utilisation and evidence-based decision making amongst healthcare managers. Utilising nonrecursive structural equation modelling to develop the Theory of Planned Behaviour

Thesis

Link(s) to article on publisher's website:
http://dx.doi.org/doi:10.21954/ou.ro.0000e986

Promoting research utilisation and evidence-based decision making amongst healthcare managers. Utilising nonrecursive structural equation modelling to develop the Theory of Planned Behaviour.

Acknowledgements

With thanks to my supervisors, Professor Andrew Thomson and Dr Jacky Holloway who stuck with me despite my shifting the goalposts and even changing the entire game many times over. To the Institute of Healthcare Management for enabling me to undertake the research and for their guidance in developing the questionnaire. To Jean and Rosemary for their thorough proof reading. To members of the online SEMNET community who provided guidance and support at all hours of the day and night and delighted in throwing in ever more complex considerations. Also thanks to Neil and Prudence who were always willing to pretend to read my drafts and listen to (and ignore) my many complaints. Finally, to my grandmother Mary Harris, who supported me at every step and who, when I was a poor undergraduate, sent food parcels and money when grants had been spent on my ever increasing shoe collection.

AUTHOR NO R7505918
DATE OF SUBMISSION 11 MAY 2005
DATE OF AWARD 08 MARCH 2006

CONTENTS

EX12

THE OPEN UNIVERSITY

RESEARCH SCHOOL

Library Authorisation Form

Please return this form to the Research School with the two bound copies of your thesis to be deposited with the University Library. All candidates should complete parts one and two of the form. Part three only applies to PhD candidates.

Part One: Candidates Details

Name: PATRICIA AMANDA HARRIS PI: R7505918

Degree: PHD

Thesis title: PROMOTING RESEARCH UTILISATION AND EVIDENCE-BASED DECISION MAKING AMONGST HEALTHCARE MANAGERS: UTILISING NONRECURSIVE STRUCTURAL EQUATION MODELLING TO DEVELOP THE THEORY OF PLANNED BEHAVIOUR.

Part Two: Open University Library Authorisation

I confirm that I am willing for my thesis to be made available to readers by the Open University Library, and that it may be photocopied, subject to the discretion of the Librarian.

Signed: .... Date: 26.4.06

Part Three: British Library Authorisation [PhD candidates only]

If you want a copy of your PhD thesis to be available on loan to the British Library Thesis Service as and when it is requested, you must sign a British Library Doctoral Thesis Agreement Form. Please return it to the Research School with this form. The British Library will publicise the details of your thesis and may request a copy on loan from the University Library. Information on the presentation of the thesis is given in the Agreement Form.

Please note the British Library have requested that theses should be printed on one side only to enable them to produce a clear microfilm. The Open University Library sends the fully bound copy of theses to the British Library.

The University has agreed that your participation in the British Library Thesis Service should be voluntary. Please tick either (a) or (b) to indicate your intentions.

[✓] I am willing for the Open University to loan the British Library a copy of my thesis. A signed Agreement Form is attached

[ ] I do not wish the Open University to loan the British Library a copy of my thesis.

Signed: .... Date: 26.4.06

h:vaxm\word\forms\EX12

ABSTRACT

The purpose of this study was to identify those factors that impede or encourage the use of research-based decision making by healthcare managers. The research drew on the Theory of Planned Behaviour (TPB), self-efficacy theory, expectancy theory and theories of research-based decision making. The interrelationships between individual, role and organisational variables were investigated, utilising nonrecursive structural equation modelling (SEM) to consider the reciprocal relationships between the variables, including the impact of past behaviour on future behaviour and its mechanisms of action. Nonrecursive structural equation modelling will be discussed in greater detail in a later chapter. However, it is worth saying a little about such models at this stage as the term has a precise meaning within structural equation modelling. Nonrecursive models are those which (perhaps counter intuitively) contain feedback loops between variables. Evaluating nonrecursive models is difficult, since it requires an understanding of necessary and sufficient conditions in order to claim that the model is identified (i.e. stable parameter estimates can be obtained).

A further aim was to explore the feasibility of employing a cross-sectional methodology to test hypotheses regarding causation, utilising SEM to estimate causal versus non-causal aspects of observed correlations. This approach enabled the testing of causal hypotheses in an area where the conditions for longitudinal research could not have been met. Causal modelling examined the

extent to which the data failed to agree with the nonrecursive model that represented the hypotheses to be tested.

Data collection. The main data set comprised responses to a postal questionnaire distributed to 2000 members of the Institute of Healthcare Managers during 2001, with a return rate of 22%.

Findings. The hypothesised nonrecursive model was a good fit across a number of sub-groups and also when considering different behaviours. As predicted, there were direct and indirect reciprocal relationships between attitude towards a behaviour and performance of that behaviour, suggesting that past behaviour influenced future behaviour by a number of channels simultaneously. The adoption of research-based decision making led to improvements in work activities and encouraged the wider involvement of employees in the strategic decision making process. A number of variables were significant in predicting the outcome behaviours. The findings thus alert managers to those factors that will encourage the adoption of this approach, and organisational researchers to the advantages and dangers of testing causal hypotheses using nonrecursive SEM.

CHAPTER 1 INTRODUCTION

1.1 Rationale for investigating this area – personal background reasoning.

At the time I decided on the PhD topic I was working in a large, UK-wide private sector industry as a Human Resources Manager. I had become interested in the nature of managerial decision making simply because, in the ten years I had spent with the Company, I had witnessed so many policy decisions which were ill thought through and almost certainly destined to result in failure. Indeed decisions that had failed in the past were often repeated once people had moved on and the original debacle forgotten by all those except the staff at the receiving end of the initiative. Many of these decisions were taken at a high human and economic cost, and yet it often appeared to be the case that their failure could have been predicted, either because the evidence was there that others had tried and failed previously, or because the theory suggested that such endeavours were likely to fail in practice. The introduction of performance related pay for a large part of the business was a particularly memorable example in terms of economic and human costs to the organisation. Motivation theories (e.g. Vroom, 1964) would have warned us that the initiative was doomed from the outset. The individuals concerned were neither able to influence the targets they had been set, nor did they value the way in which they were to be rewarded. The scheme was very costly to implement, demoralised thousands of managers and was scrapped in little over a year as performance measures dropped. At the same time, there appeared to be the perception that such decisions were actually rewarded within organisations: few questions were asked about the evidence or the theory behind the decisions, and more often than not the person initiating the project had moved on before its inevitable failure.

Management consultancy firm followed management consultancy firm into the organisation. Millions of pounds were spend keeping up to date with the latest management fashion, which frequently lacked any sound theoretical basis or even evidence of its effectiveness. We 'process re-engineered', we held 'brown-paper fairs' to look at our systems, we 'sheep-dipped' everyone through a culture change programme, checked we had a 'balanced scorecard', we 'benchmarked' and talked of 'adding value' and 'best practice'. We grasped at every management fad with a surprising lack of cynicism. Few questions were asked about the evidence upon which the latest model or initiative was based, nor the theory that underpinned it. Where evidence was supplied it was often outdated as were many of the management theories that were espoused. On occasions, more recent evidence could have been obtained, more current theories were almost always available, yet these were overlooked, generally in favour of more simple, easily explained, theory. For example, content theories of motivation were preferred over the more complex process theories, albeit the latter were better researched and had greater explanatory power. There was undeniably a huge research-practice gap.

Management consultants were generally very effective at marketing their products to senior managers within the organisation, far more effective than the academics who would make far more modest claims for their products and services, which also lacked the glossy, eye-catching design of those purveyed by the consultants. Yet this was not an organisation which failed to invest in management training and development, a great deal was invested in new managers' induction, and on the ongoing development of the management population. I began to wonder if we might be failing in one important respect; we paid no attention to critical reasoning and decision making in our management training. In fact, there was the implicit belief that managerial decision making is too 'messy' and cannot really be taught, something you've either 'got' or you haven't –something instinctive.

It appeared that even basic critical reasoning and statistical skills were generally lacking in the management population, and that the effect of this was poor decisions were made, and agreed, which might otherwise have been more rigorously questioned. On one particular occasion I was asked to replace the word 'correlation' with 'relationship' in a presentation as members of the board may not understand the former. The question which concerned me was the extent to which decision making could actually be improved by developing the above mentioned competencies. I wondered if we might be failing managers by not ensuring these skills formed part of their continuing professional development. There were no rewards for developing or demonstrating such skills or for keeping one's professional knowledge base up to date. I hoped, within the PhD, to explore the issue of management decision making and the extent to which critical reasoning and rational decision making can be taught, and if so, what material difference this would make within the context of the organisation. Was decision making which failed to take theory and evidence into account due to lack of skills or intellectual laziness, or was there an alternative explanation? Perhaps it could be better explained by the nature of managerial decision making, for example the inability to generalise from one situation to the next in management, to recognise when such generalisations were appropriate, or to obtain the evidence sufficiently quickly because of the speed with which decisions are taken in business?

Of course, some decisions were made for political reasons rather than (even the attempted appearance of) a rational appraisal of the evidence, although it is fair to say those occasions were not as frequent as those on the receiving end of the decisions imagined. Again, such decisions rarely met with much opposition, and this led me to question whether a focus on critical reasoning and evidence-based decision making might help prevent, or reduce, political decision making in organisations. Nilsson and Sunesson (1993) described this process as 'scientification', the replacement of ideology and political reasoning with science. They ask whether decision making as a political activity, can be replaced with decision making as a rational activity? Certainly it would appear to offer the potential to get more people involved in the decision making process if it is based on rational analysis rather than political opportunism as it has the potential to be more democratic and open. It can also provide a shared frame of reference and a shared language through which to make sense of what is happening, to agree the validity of the evidence, and formulate a plan on the basis of that evidence. Of course this does assume a high degree of rationality in the decision making process, and this issue will be discussed in greater detail below.

The questions seemed particularly pertinent at a time when we all face an information explosion. There has been a high investment in decision support systems and information databases over a number of years. Quintas (2002 p.1) notes that, 'the huge amount of information out there that's accessible is remarkable. While we all suffer from information overload, systems and search engines are improving, making identification of the information we need easier all the time.' It is increasingly claimed that knowledge and information drive the economy of the world, but we rarely question the quality of that information, or what might prevent the dissemination or utilisation of reliable information. Furthermore, whilst we appear to have a surfeit of information, people frequently claim to lack the specific information they need to make a particular decision, at the time they need to take it. Decision making based on the principles of sound 'evidence' and critical reasoning offered the potential of making sense of this perceived information explosion, of grading and ordering the evidence in a way which could serve as a useful knowledge base for managers. Potentially this could operate in a similar way to the Cochrane Library, which had built up a body of knowledge for clinicians based on the principles of 'evidence-based medicine.' Introductory information about the principles of evidence-based medicine (EBM), from which this approach developed, follows next.

1.2 Evidence-based medicine: An introductory overview

Evidence-based medicine is described by Sackett *et al* (1997, p. 2) as, 'the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients...The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.' In general terms, it appeared to me that the types of information required by the line manager were not dissimilar to those of the medic: understanding of 'what's going on' (categorising events), predicting future events, understanding causes, controlling future events, explaining past events. Where EBM was being practised within the NHS it was perceived to be successful; it was quickly gaining a large following amongst doctors and nurses and their professional bodies were advocating training in the methodology as part of one's continuing professional development.

A variety of professional bodies were beginning to explore the applicability of evidence-based decision making to their own specialisms, such as education, social work and criminal justice; frequently driven by the need to promote a better link between research and practice. Similarly, medics and government advisors were starting to ask questions about its application in policy development and managerial decision making more generally. There was an argument that if clinicians are expected to justify the decisions they make on the basis of sound evidence, then so should managers and policymakers. Muir Gray (1997 p.57) comments, 'it is important that a double standard is not introduced, namely that policy makers and managers do not exhort clinicians to implement research findings in clinical practise when they themselves are either not actively searching for evidence or failing to implement knowledge derived from research when it is presented to them.' There is an increasing demand that managerial, as well as clinical decisions within the health service are 'evidence' (or research) based. This drive stems primarily from the NHS R&D strategy to: 'secure a knowledge-based health service in which clinical, managerial and policy decisions are based on sound and pertinent information about research findings and scientific and technological advances ..... maximising the effectiveness, efficiency and appropriateness of patient services.' (DoH, 1995) Certainly there was a desire at a governmental level to make policy decisions based on the 'best evidence': for example, governmental directions such as 'Vision for the Future' (Department of

Health, 1993) that sets required targets for the introduction of research-based practice. The links between reliable knowledge and policy development are widely seen to be tenuous or non-existent. Yet David Miliband, the head of Prime Minister Tony Blair's Policy Unit, had stated clearly in 1999 that, the challenge is for a more profound change in the relationship between the government and intellectual life, whether it is based in academia, the voluntary sector or industry.

Understanding the conditions that motivate or deter information seeking had become a critical concern for organisational researchers. A positive correlation has been found between management success and effective information needs identification, gathering and use (Goodman, 1993) yet few studies have investigated managers' perceptions concerning research utilisation. I was interested in exploring the extent to which research evidence is sought out by managers, is utilised in practice, and whether or not (and how) it is perceived to be useful. I also wanted to better understand the barriers to research seeking and its utilisation and those factors that might facilitate its use. I wanted to explore these factors at an individual, role, and organisational level, and the inter-relationship between these factors.

1.3 Institute of Healthcare Managers (IHM): the research partners

The research was undertaken with permission from the Institute of Healthcare Management (IHM). The IHM is the largest UK professional body for managers working in health. They have around 9,000 members, primarily managers working within the NHS, but also have members from commercial organisations, management consultancies and academia.

The Institute's stated purpose, as noted on their website (www.ihm.co.uk, accessed 2005) is, 'to enhance and promote high standards of professional healthcare management in order to improve health and healthcare for the benefit of the public.' It encourages members to take part in continuing professional development activities as an integral part of their professional life and aims to support them in this through a variety of training and development information and events. The IHM was thus regarded as a relevant source of informants who were interested in keeping their knowledge base up-to-date, and who worked in environments where this was encouraged to a greater or lesser extent.

In order to become a member of the IHM it is necessary to satisfy the following criteria:

Two years healthcare management experience or five years senior management experience outside of the health sector and

a recognised professional or managerial qualification or demonstrable relevant experiential learning.

There was little knowledge of the extent to which healthcare managers understood, and had the skills to adopt, evidence-based decision making. Neither did the Institute or I understand how relevant and/or effective healthcare managers had found such an approach where it had been adopted.

An initial meeting with the management board suggested that whilst managers were aware of the rise of evidence-based decision making within the clinical arena, there was still some debate around whether or not this was appropriate to policy (rather than medical) decision making. Certainly managers were coming under increasing pressure from their clinical colleagues to justify any decisions by pointing to the relevant supporting 'evidence', but there was the widely held view that healthcare managers must take many other factors into account in reaching their decisions. Research evidence could only ever be one part of the equation, and it was unclear how important a part it could play when we one is considering policy decisions. The IHM had an interest in better understanding these issues and it was agreed that I could conduct the research amongst their membership.

1.4 Research aims and hypotheses

I aimed to develop and test an integrated model of information seeking and utilisation that contained a number of latent variables operationalising: the task requirements, the organisational environment, as well as individual and role characteristics. The research tested whether the model provided a good fit for the data and demonstrated the extent to which decision makers' research seeking (and utilisation) behaviour is directly and indirectly affected by a variety of inter-related factors, not dominated by a single perspective (e.g. organisational interest or rational actions of decision makers). It is clear that the use of research information is a complex phenomenon; one must consider individual and organisational factors, as well as specific characteristics of the information itself and the context in which it is being used: for example, how easy the information is to access, whether or not there is time to access it and whether managers and practitioners then have the authority to implement any findings from the research into their work.

Generally, researchers in the field of decision making have focused upon one set of variables whilst ignoring other factors. Rich (1997) rightly points out that we do not have a comprehensive conceptual framework, one which (a) identifies and distinguishes the variables involved, and (b) examines how these various factors are linked. The research literature identifies a number of factors that are believed to influence the extent to which research will be utilised within an organisational setting, and the likelihood of positive outcomes arising out of this practice. These have been split into three main categories: individual factors, organisational factors, and role characteristics. None of these factors operate in isolation, and one of the purposes of the research was to determine not only the relative importance of these factors, but to gain a better understanding of their complex interaction within the framework of the Theory of Planned Behaviour (TPB).

The overall aim, therefore, was to employ both recursive and nonrecursive structural equation modelling to test the hypothesised relationships between a number of variables identified in the literature as promoting or militating against the following behaviours: research-seeking, research utilisation, evidence-based decision making and the political use of research evidence. Individual, role and organisational variables were considered in the model. It was hypothesised that the variables in the model would predict a high degree of the variance in the behaviours of interest and in each of the sub-groups examined.

Whilst it is generally accepted that there is a reciprocal relationship between attitude towards a behaviour and the performance of that behaviour, this feedback loop (which necessitates the use of nonrecursive structural equation modelling) has not been explicitly tested in models based on the Theory of Planned Behaviour or expectancy theory (VIE). This is despite the belief of many proponents of such theories that past behaviour does have an impact on future behaviour over and above that explained by the variables included in the models. A number of theories, discussed later, suggest that past behaviour can have a direct impact on attitudes towards that behaviour. The nonrecursive model tested proposes that not only will past behaviour predict attitude towards that behaviour directly, but that it will also have an indirect relationship via its positive impact upon perceived behavioural control ('instrumental' variables in expectancy theory): a multidimensional construct which incorporates self efficacy. The research tests these feedback loops simultaneously. This then provides an indication of the relative strength of each of the feedback loops when we control for the effects of all other variables in the model.

To fulfill the overall aims there were, therefore, two key objectives for the research:

A. **To expand the theory of planned behaviour (and expectancy theories more generally) by utilising nonrecursive structural equation modelling to explore the impact of past behaviour on future behaviour.**

B. **Group comparisons. To identify those factors that support or prevent the adoption of research based decision making across a number of sub-groups, based on the findings from the nonrecursive model.**

Specifically, to investigate how the moderating variables might alter the strength and direction of these relationships.

The hypotheses related to the first of these objectives will be outlined and tested first.

Hypotheses related to objective A:

Hypothesis 1

Variables identified in the Theory of Planned Behaviour will predict a high degree of the variance in *research utilisation*, *research seeking* and *evidence-based practice*.

Hypothesis 2

Personality variables (i.e. *need for cognition*), *academic achievement*, *experience*, *grade, decision-type* and environmental factors (*organisational learning climate* and *managerial influencing style*) would be important additional predictors to those identified in the Theory of Planned Behaviour.

Hypothesis 3

Nonrecursive models will obtain improved measures of fit, in comparison with the recursive model (specified by the TPB) which ignores causal relationships between the predictor variables, some of which will impact directly upon the behaviour, others via their impact on *attitude to research*.

Hypothesis 4

The original model's use of broad constructs (assumed to be unidimensional) disguises the way in which sub-factors within these global constructs operate differently in predicting behaviour.

Hypothesis 5

The recursive model will be overly simplistic, in that it does not predict how past behaviour might influence future behaviour via the following mechanisms:

a. Increasing *skill level* (self efficacy)

b. Improved *attitude to research*

c. Increasing views about mastery over external environment (*extrinsic Perceived Behavioural Control – time, access, authority*)

d. *Perceived improvements*

Thereby over or under predicting the regression weights.

<u>*Hypotheses related to objective B*</u>

Organisational and role factors:-

Hypothesis 6

Perceived Behavioural Control (both intrinsic and extrinsic) will predict both *attitude to research* and *the adoption of an evidence-based practice* and *research utilisation*, in each of the sub-groups.

Hypothesis 7

Extrinsic rewards will be a negative predictor of *attitude to research* in all sub-groups, and will be a stronger predictor for those people in lower-graded posts.

Hypothesis 8

Team utilisation of research will be a predictor of the behaviours in all of the sub-groups, and will be a stronger predictor where there are fewer social pressures *outside of the team to engage in these activities, (i.e. in the non-clinical group). Team utilisation of research* will also be a stronger predictor of the behaviours where people undertake higher levels of *Continuing Professional Development (CPD).*

Hypothesis 9

A threatening and demanding management influencing style will be a stronger direct predictor of the behaviours where respondents work in environments where these behaviours are expected (i.e. in the clinical groups).

Hypothesis 10

A threatening and demanding management influencing style will also impact the behaviours negatively and indirectly, via *attitude to research*, in each of the sub-groups. It will be a stronger predictor where respondents work in environments where these behaviours are expected (i.e. in the clinical groups).

Hypothesis 11

Organisational learning climate will impact upon the behaviours indirectly via its effect on *perceived behavioural control.* It will be a stronger predictor of *extrinsic and intrinsic PBC* in the clinical groups.

Hypothesis 12

The clinical management group, and those in higher grades, will be significantly more likely to generate *improvements* from research utilisation and the *adoption of an evidence-based approach.*

Hypothesis 13

The importance of *grade* (and *education)* in predicting *decision-type* will be less important in the clinical groups, and where people undertake higher levels of *Continuing Professional Development.*

Individual factors:-

Hypothesis 14

Aspirations will be a direct predictor of the behaviours modelled for each of the sub-groups, and will be a stronger predictor where these behaviours are expected (i.e. in the clinical group).

Hypothesis 15

Attitude to research will be a direct predictor of the behaviours to be modelled in each of the sub-groups, and will be a stronger predictor when we consider respondents working in the clinical groups, and where people engage in higher levels of *CPD.*

Hypothesis 16

Need for cognition (complexity) will be a weaker predictor of *attitude to research* in the clinical groups, and will be a stronger predictor where respondents are in higher grades.

Hypothesis 17

Respondents' *length of service* will be negatively correlated with *attitude to research* in each of the sub-groups, and this will be significantly higher where the respondent works in a *climate* where evidence-based practice is a relatively recent phenomenon (i.e. the non-clinical management group).

Hypothesis 18

Education level will be a predictor of the behaviours modelled, only via its impact on *critical appraisal skills*, and will be a stronger predictor of these skills in the clinical groups.

I also wanted to consider those factors that encourage or reduce the political use of research evidence:

Hypotheses related to the political use of research evidence

Individual factors:-

Hypothesis 19

Political utilisation of research evidence within the team will increase *political use of research evidence by the individual.*

Hypothesis 20

Political utilisation of research evidence within the team will have a negative impact on the individual's *attitude to research.*

Organisational and role factors:-

Hypothesis 21

A management influencing style based on threats and demands will increase *political utilisation of research evidence by the individual.*

Hypothesis 22

An *unsupportive learning climate* will increase *political utilisation of research evidence.*

1.5 Overview of the chapters in the thesis

Chapter 2 contains part one of the literature review, which expands upon the development of evidence-based medicine, its guiding principles, and its application to other professions. The concept of rational decision making is discussed, and the criticisms of such an approach are highlighted. Chapter 3 forms part two of the literature review and discusses the research to date in the area of research-based decision making and identifies those variables that prior research has highlighted as important predictors of research seeking and the adoption of a research (or evidence) based approach.

Chapter 4 details the methodological approach taken, and highlights the benefits of structural equation modelling over other approaches. This chapter also discusses the current issues in structural equation modelling and, in particular, the debates surrounding the overall 'fit' of the hypothesised model. Prior to testing this larger structural model, however, one must also identify which items to include in the underpinning measurement models. It is not possible to include all of the items included in each scale in the larger model, and so the process of operationalising the variables is key to enabling the reader to decide the extent to which the items included in the model are an adequate representation of the construct of interest. This is the topic of chapter 5.

Chapters 6 and 7 provide details of the analysis of the structural models. Chapter 6 focuses specifically on the extent to which the predictor variables are able to explain the behaviours of interest, utilising nonrecursive structural equation modelling to explore the impact of past behaviour on future behaviour. Chapter 7 is concerned with testing the hypotheses relating to group differences. Chapter 8 includes a discussion of the research findings and the implications of these findings for practice. The final chater considers the contributions of the research to the present knowledge base as well as its limitations and concludes with a discussion of how future research might develop in this area.

CHAPTER 2 LITERATURE REVIEW: UNDERPINNING THEORIES

2.1 Introduction

Chapter 1 sets out the reasons for my interest in exploring evidence-based decision making amongst healthcare managers, and provides an overview of the development of this movement within the clinical arena. I discuss the research aims and objectives and outline the hypotheses to be tested. I outline my interest in exploring not just the extent of research use amongst clinical practitioners, and how this might differ between sub-groups, and also the impact of a number of variables which theory tells us would encourage or militate against the use of evidence in practice. I also discuss my intention to expand upon the Theory of Planned Behaviour in order to be able to take into account causal relationships between the predictor variables, and also to account for past experiences related to research utilisation. This second chapter introduces the concepts of evidence-based medicine and research-based practice, discusses their application by clinicians and their applicability to more general management decision making. Criticisms of these approaches are reviewed. The Theory of Planned Behaviour and the Theory of Reasoned Action are discussed and their limitations identified in greater detail.

2. 2 Evidence-based medicine and research-based practice

2.2.1 Policy changes in the Clinical Arena

Evidence-based medicine (EBM) was developed at McMaster University in Canada less than 15 years ago, although it has since been adopted at many other institutions throughout the world. The members of the McMaster group, (namely, Guyatt, Gordon, Sackett and Cook), declared EBM a new paradigm for medical practice (1992). The evidence-based movement has been met with remarkable enthusiasm. Mykhalovskiy and Weir (2004, p. 1060) note that, 'EBM has been formally incorporated into editorial policies, has spawned new journals and approaches to reporting biomedical research, and is now routinely taught throughout medical schools in North America, the UK, and parts of Western Europe. Even more impressively, EBM has extended its reach well beyond the domain of medicine'. The authors, although generally enthusiastic about such an approach, go on to comment that we appear to be living in a time of 'evidence-based everything'

EBM is described by Haynes *et al* (1996, p. 196), who suggest that, 'the practice of EBM is a process of lifelong, self-directed learning in which the demands of the job create the need for important information about how best to diagnose and treat the problems presented... It cannot result in slavish, cook-book approaches to individual patient care....any external guideline must be integrated with individual clinical expertise in deciding whether and how it should be applied.'

Sackett *et al* (1997) identify the five steps that form the evidence based approach:

-Converting information needs into answerable questions.

-Tracking down (with maximum efficiency) the best evidence with which to answer these questions.

-Critically appraising this evidence for its validity and usefulness (applicability).

-Applying the results.

-Evaluating our performance.

A great deal of guidance is given by the authors about how best to undertake these five steps, including the formulation of questions and how to track down the best evidence. They detail the criteria for scientific merit in selecting which articles to read, and how to go about critically appraising such articles to determine their merit. In terms of critical appraisal he recommends answering the following three questions:

- was there an independent, blind comparison with a reference standard of diagnosis?
- was the diagnostic test evaluated in an appropriate spectrum of patients? (like those in whom it would be used in practice).
- was the reference standard applied regardless of the diagnostic test result? (This is concerned essentially with randomised sampling, generalisability, drop out rates, validity etc).

Sackett *et al* also note four elements of a well-built clinical question:

1. How do I describe the group of patients similar to mine?
2. What is the main intervention (prognosis, or diagnosis) I am considering? (be specific).

3. What are the main alternatives? Are they better or worse?

4. Outcome. What could I hope to accomplish? What would the effect be?

They suggest that clinical questions arise from:

1. Gathering and interpreting information from the patient history and/or exam.
2. Identifying causes.
3. Ranking causes by likelihood, seriousness or 'treat-ability.'
4. Selecting and interpreting diagnostic tests.
5. Prognosis. Estimating course over time, likely complications.
6. Therapy. How to select treatments.
7. Prevention. Identifying disease early and/or identifying and modifying risk factors.
8. Self improvement. Questioning how to improve your own skills/knowledge.

Where you have more questions than time, they suggest that you rank the questions on the basis of:

- which is most important to patient's well-being?
- what is the most feasible to answer in the time available?
- what is most interesting to you?
- which is likely to most commonly arise?

Evidence-Based Practice has evolved in both scope and definition over the last decade. Delegates attending the 2003 Conference of Evidence-Based Health Care Teachers and Developers ("Signposting the future of EBHC") identified the need to agree a clear statement of what Evidence-Based Practice (EBP) means and a description of the skills required to practise in an evidence-based manner. Their consensus statement was based on the current literature and incorporated the personal experiences of delegates from a variety of specialisms. They agreed that, 'All health care professionals need to understand the principles of EBP, recognise it in action, implement evidence-based policies, and have a critical attitude to their own practice and to evidence. Without these skills professionals will find it difficult to provide "best practice" (Dawes *et al* 2005, p 2).

The obvious question arises as to the extent to which this approach can be applied in more general managerial decision making. The authors' thinking around the types of skills needed, does, however, provide us with a starting point in terms of the critical appraisal skills needed more generally in the management population.

2.2.2 <u>Why was Evidence-based Medicine (EBM) introduced?</u>

Despite claims to the contrary, Sackett *et al* (1997) found that practitioners engaged in little continuing professional development, with the result that skills were degenerating over time. For example, they mention a Canadian study of actual clinical behaviour, which found that the decision to start antihypertensive drugs was better predicted by the number of years since medical school graduation of the doctor, than it was by the severity of organ damage in the patient. The authors suggest that, 'trying to overcome this clinical entropy through traditional continuing medical education programs doesn't improve our clinical performance.' (p. 10) They note that, 'We become out of date and our patients pay the price for our obsolescence.' (p. 10). They goes on to claim that, 'the issue is no longer how little medical practice has a firm basis in evidence; the issue today is how much of what is firmly based is actually applied in the front lines of patient care.' (p 7). There are huge quantities of research to keep up with, the information is not in an accessible form and is too thinly spread. They undertook research which examined the effectiveness of traditional forms of CPD and concluded that, 'traditional, instructional CME (Continuing Medical Education) simply fails to modify our clinical performance and is ineffective in improving health outcomes of our patients.' (pp. 10-11).

In terms of the quality of research, Sackett *et al* (1997) note that a study of journal articles showed that experts could not agree, even amongst themselves, about whether other experts who wrote review articles had: (i) conducted a competent search for relevant studies (ii) generated a bias-free list of citations (iii) appropriately judged the scientific quality of the cited articles or (iv) appropriately synthesised their conclusions. Indeed, when these experts' own review articles were subjected to these same simple scientific principles, there was an inverse relationship between adherence to these standards and self-professed expertise. The authors concluded that the majority of articles do not adhere to scientific principles.

Practitioners also were found to underestimate their information requirements in decision making. They give an example of research undertaken with a group of North American physicians. A questionnaire determined that respondents generally suggested that they needed new and clinically important information just once or twice a week, and met these needs through the reading of journals and textbooks. 'Shadowing' of these medics, however, identified that in a typical half-day of practice, four clinical decisions per doctor would have been altered if clinically useful information about them had been available and employed. This suggests that, ideally, the evidence ought to be consulted for each individual consultation where it is available. Further probing found that the textbooks used were very quickly out of date, and the professional journals too disorganised to be useful. Relevant research was frequently not in an accessible form, and that in practice, most information was obtained by asking the opinion of colleagues. Empirically supported methods were routinely ignored in favour of intuition and past experience; certainly practitioners did not access the most reliable and least biased sources of information.

Sackett *et al* suggest that the issue today is not about a scarcity of information which could better inform practice, but rather how much of this research is actually read and applied. Important new evidence from research often takes a long time to be implemented in daily care, while established practices persist, even where these practices have proven to be ineffective or harmful.

2.2.3 Searching for the best evidence and critical appraisal of the evidence

The sheer volume of clinical literature, plus a high variation in the quality of papers and articles, led to the introduction of two new information sources for use by practitioners. The first is a journal of secondary publication of structured abstracts (the best evidence) and clinical commentaries (the clinical expertise which places the abstracts in their appropriate clinical context). Rigorous scientific and clinical filters reject 98% of the clinical literature as not meeting the requisite standards for inclusion (An example of this information source would be the Journal of Evidence-Based Mental Health).

The second information source is the synthesis of evidence across all trials of a given intervention, into overviews or meta-analyses. These are published in a variety of formats, including CD ROMs, and appear on the internet. The Cochrane Library is one of the main sources of this type of information. Sackett *et al* note that, '...busy clinicians seeking clinical 'bottom lines' will increasingly be able to eschew non-expert 'expert' reviews and self-serving commercial sources and find brief but valid summaries of best evidence on a growing array of clinical topics, appraised according to uniform scientific principles.' (p. 15). The clinical commentaries explicitly identify, appraise and summarise, in ways that are most relevant to decision makers, the best evidence about prevention, diagnosis, prognosis, therapy, harm and cost-effectiveness. They explicitly identify the decision points at which this valid evidence needs to be integrated with individual clinical expertise in deciding on a course of action.

Sackett *et al* suggest that the practitioner needs to know: what sources are available, how they're organised, which search terms to use and how to operate the searching software. They also give advice on assessing 'clinical guidelines' which are provided as guidance for health care professionals. They suggest assessing whether:

- all important decision options and outcomes are specified.
- the evidence is relevant, identified, validated, and appropriately

combined.

- the relative preferences of stakeholders are defined.
- the guideline is resistant to clinically sensitive variations in practise.

One tactic they suggest for tracking progress is the 'educational prescription' which is particularly helpful when working on a given problem as part of a team:

- specify the problem that generated the question.
- state the question, in all of its key elements.
- specify who is responsible for answering it.
- remind everyone of the deadline for answering it.
- remind everyone of the steps of searching, critically appraising and ultimately relating the answer back to the patient.

The learner is prompted to preserve and share these critical appraisals where they generate useful results. They are asked to prepare and present one-page summaries of the evidence, organised as a 'critically appraised topic' or CAT. Details are given on how to prepare CATs, and the Centre for Evidence-Based Medicine in Oxford has developed, on its World-Wide Web page, an option (CAT-Maker) that will talk them through the generation of a CAT and provide them with a copy of the finished paper. Users can store and retrieve CATs that they, and others, have placed on the database.

The authors go on to list a series of questions that the learner should answer in applying the research findings to their particular situation; this involves integrating the available evidence with the learners' clinical expertise. They list those features that are critical in identifying whether a 'quality improving strategy' is likely to meet with success or failure.

Whilst clinicians may acquire the skills and knowledge for practising EBM 'on the job', there are also workshops available which provide a more focused and concentrated education. These workshops are typically run with 5-10 learners and are centered around real life problems. Lots of time is set aside for small group meetings, individual study and meetings of ad hoc interest groups. Participants and organisers keep in touch in order to trade ideas on how to practise EBM and improve future workshops. The University of Exeter now offers an EBM course as part of its CPD scheme, and Oxford University have a web-based 'toolkit' including a Multimedia Critical Appraisal Product, which covers the skills of critical appraisal, as well as search techniques. We would expect that general managers would have less access to research materials, as there is a much shorter history of utilising research evidence in day-to-day practise.

2.2.4 <u>What evidence is there that EBM 'works'?</u>

Sackett *et al* (1996, p.71) note that, 'studies show that busy clinicians who devote their scarce reading time to selective, efficient, patient driven searching, appraisal and incorporation of the best available evidence can practise evidence-based medicine', and that clinicians who keep up to date with these advances in knowledge practise better medicine. Sackett also believes that an EBM approach meets the recommendations appearing from commissioning bodies and standing committees addressing the education of both future and current clinicians around the world.

When McMaster graduates of their self-directed, problem-based EBM curriculum were compared with other Canadian medical graduates on their knowledge of clinically important advances in the detection, evaluation and management of hypertension there was a statistically significant difference in this measure of competence between the McMaster graduates and those of traditional medical schools.

Final year medical students working at McMaster University received their weekly clinical tutorials from tutors who had taken a course in applying EBM. These tutors were helped to construct educational 'packages' that included external clinical evidence about diagnostic tests and treatments that were bound to arise, plus essays on how to critically appraise those sorts of evidence. 'Control' medics (again from McMaster) received tutorials from tutors who had not undergone this training. Before and after the tutorials both groups were given scenarios describing patients' clinical problems, calling for diagnostic and treatment decisions and accompanied by a clinical article advocating a specific diagnostic test or treatment for such patients. After the evidence-based tutorials the experimental group made more correct decisions and were better able to justify them whereas the control group's performance deteriorated. Sackett notes that even in this environment, with its emphasis on problem-based, self-directed life-long learning, there was a need to promote skills in critical appraisal. Of course, the problems faced by general managers are perceived to be quite different from those faced by clinicians, although it is difficult on the face of it, to argue with the proposition that policy decisions too should be based upon the best available evidence.

2.2.5 *Issues in adopting an evidence-based approach*

McColl *et al* (1998) randomly selected a sample of 25% of all General Practitioners in the former Wessex administrative region of the NHS. Questionnaires were distributed to 452 GPs, of whom 302 replied. He examined respondents' attitude towards evidence-based medicine, ability to access and interpret evidence, perceived barriers to practising evidence-based medicine, and best method of moving from opinion based to evidence-based medicine. He found that respondents mainly welcomed evidence-based medicine and agreed that its practice improves patient care. McColl *et al* also found that, although GP respondents felt that adopting an evidence-based approach improves patient care, they had a low level of awareness of extracting journals, reviewing publications, and databases, and, even when they had this awareness, many did not use them in their work.

The major perceived barrier to practising evidence-based medicine was lack of personal time; i.e. time available away from essential day-to-day activities which must be undertaken to meet one's objectives. Respondents thought the most appropriate way to move towards evidence-based general practice was by using evidence-based guidelines or proposals developed by colleagues. McColl *et al* conclude that 'promoting and improving access to summaries of evidence, rather than teaching all general practitioners literature searching and critical appraisal, would be the more appropriate method of encouraging evidence-based general practice.' (p. 361) They believe that general practitioners who are skilled in accessing and interpreting evidence should be encouraged to develop local evidence-based guidelines and advice. It is still the case that information searches are still rather messy and one often has to wade through a considerable amount of data to obtain the necessary information. It is also true, however, that considerable improvements have been made in the medical arena in refining the search engines, and the information contained within the research articles. In the UK a considerable amount of work has been undertaken by the Centre for Evidence-Based Medicine at Oxford. It has, for example, introduced journals, which focus on summarising high quality research evidence and discussing its implications for practice.

There is also an issue around implementing the results of one's findings into day-to-day practice. Dinant (1997) suggests that what is needed is 'medicine-based' studies that include, not ignore, clinical reality and its inherent difficulties. He is concerned that the real life experiences of GPs in the surgery (dealing with far less clearly defined problems than those isolated for research purposes) should not be ignored, despite not always meeting the strict methodological criteria of an evidence-based approach. He also draws our attention to a concern that there may be an element of 'risk avoidance' by clinical researchers. They might focus their energies on topics where the methodological criteria of reviewers and editors can be most easily met, rather than studying real life clinical problems that present substantial methodological problems.

Main (1999, p. 332) echoes these concerns and questions whether it is possible that, 'the evidence-based medicine lobby is so busy reviewing the literature that it has lost touch with the rather disorderly world of real medical practice?' He suggests that, 'until those advocating evidence-based medicine have a better understanding of what actually happens when patients and doctors meet, their scrupulous search for the truth will provide a disappointingly small input into the practice of medicine'. Sackett and Strauss (1998) respond to Main's criticisms. They reiterate that practising evidence-based medicine begins and ends with clinical expertise, and also that pre-appraised evidence often can be accessed by busy clinicians in seconds. They claim that audits in medicine, surgery, psychiatry, and general practice, have all shown that clinical services that strive to provide evidence-based care can do so for about four fifths of their patients. They state that, 'by individual clinical expertise we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice.' (p. 71) Greenhalgh (1999, p 2) notes, however, that, 'Sackett and colleagues were anxious to acknowledge that there is an art to medicine as well as an objective empirical science but they did not attempt to define or categorise the elusive quality of clinical competence.' There appears to be a parallel here with the problems said to be faced by general managers; their issues might not be as different as supposed.

Green (1998, p. 1230) suggests that qualitative methods can help bridge the gap between scientific evidence and clinical practice. She claims that 'rigorously conducted qualitative research is based on explicit sampling strategies, systematic analysis of data, and a commitment to examining counter explanations.' She suggests that methods should be transparent, allowing the reader to assess the validity and the extent to which results might be applicable to their own clinical practice. There is a question mark, however, over the ability of practitioners to critically appraise both qualitative and quantitative research. There is the further complication that, whilst qualitative research can play an important role, it can rarely be aggregated in the same way that some qualitative research evidence can, in the form of a meta-analysis.

It is also important to note that evidence-based decision making as an approach has not been without its critics from scientific, philosophical and sociological perspectives. It has been argued, for example, that this approach does not support paradigm shifts or advances based upon intuition or serendipity. Greenhalgh (2002, p. 395) argues that 'it is high time to call a halt to the false dichotomy between clinical intuition and the demands of an evidence-based approach, by raising the status of intuition as a component of expert decision making.' Furthermore, it could be argued that an evidence-based approach is based upon current evidence within an accepted framework and would not support 'learning about learning'. Sehon and Stanley (2003) make the distinction between 'first-order' and 'second-order' questions and argue that an evidence-based approach is concerned primarily with the former, operating from within a predetermined epistemological framework. The questions raised, they suggest, are the *basic* questions, or first order questions. By contrast, *second order* questions are questions *about* the first order questions. The authors give examples of second order questions, such as 'what is EBM?' 'What are the alternatives to EBM?' ' What is the relationship between EBM and the alternative approaches to medicine?' These are the philosophical and value-laden questions that an evidence-based approach to decision making (as it is currently defined) is unable to address.

Cohen *et al* (2004) notes that the root of many of the criticisms of an evidence-based approach stems from the name. The authors suggest that we would have been better served if the decade of discussion had instead focused on the best ways to incorporate evidence into, what is invariably, a multi-faceted decision making process.

Knowledge management could potentially offer a process for identifying and creating knowledge assets and for utilising these assets to better achieve organisational objectives through an integrated system that enables staff to access this knowledge when and where needed. This highlights the necessity of presenting information in a way that mirrors the users' needs if the system is to be successful. One must also, however, have a system that ensures that the knowledge contained therein is constantly updated and meets rigorous quality standards. Win and Croll (2005) remind us that health information systems are, of necessity, complex and diverse. They provide some examples of the complexity and range of information which must be integrated if the system is to be useful: computer-stored databases containing patient information to support medical order entry, results reporting, decision support systems, clinical reminders, the pharmacy system, management information systems, bibliographic retrieval systems, laboratory information systems, nursing information systems, medical education systems, office systems and clinical research systems. Further, Castleman *et al* (2005) remind us of the importance of context in the transition from data to knowledge, and how important it is for decision makers on occasions to be able to share information face-to-face in an attempt to overcome this problem, so that essential aspects of the context are understood. Despite all of the obstacles that must be overcome, Walhe and Groothuis (2005, p. 31) found that, 'If protocols, guidelines and procedures have been drawn up in accordance with the latest state of the art, this leads to an improvement in patient care.'

2.2.6 *The environment in which healthcare managers operate*

Borrill and Haynes (2000 p. 24) found that, 'Stress is more prevalent among NHS managers than those in other sectors', and that, 'Managers suffer more stress than other groups in the NHS.' Their view was that managers' perceived failure to influence decision making was particularly stressful. Smith *et al* (2001) note that 'NHS managers are used to being unloved by the public and health professionals.' and goes on to suggest that they now also find that 'their political masters have little regard for them' a situation which leaves them isolated and disempowered. They claim that Ministers have a 'command and control style' of management (partly a reflection of the lack of trust and respect) in which unrealistic targets and objectives are given to healthcare managers, who are left feeling undermined and undervalued. They write:

'It is fashionable to espouse the virtues of evidence-based policy making, in which robust evidence about the efficiency and effectiveness of policy proposals plays a significant role in policy development and implementation. Yet the government's NHS reorganisation is an evidence free zone, with no research cited to suggest that the changes will improve the performance of the NHS and plenty that indicates they may do the reverse.' (p. 25)

Having worked within the NHS in a managerial role during the 1980s, I could relate to Drife and Johnson's (1995, p. 1054) description of the NHS as a 'multicultural society'. They note that, 'Each profession - medical, nursing, management, and many others - has its own identity, culture, and subcultures.' They focus specifically on the relationship between NHS managers and doctors.

They comment that whilst healthcare managers generally complain that doctors are unaware of the need to balance competing priorities, and to look at the wider picture, doctors often feel that managers do not always put the needs of their patients first, and do not understand the particular problems faced by their department.

Learmonth's research (1997) suggests that the public have little sympathy for the healthcare manager, and will always side with the doctors and nurses who they perceive to be caring and patient-centred, whilst managers are seen to have a cold, detached, rational approach to problem solving. The author suggests that management tools may have proven to be a double edged sword. Yet the medical profession has been moving towards a more rational, evidence-based approach to decision making, and arguing that healthcare managers should do the same (Muir Gray,1997). I wanted to explore the utilisation of research-based decision making by both clinicians and general managers, and the factors each believed were important in supporting the adoption of this approach.

2.2.7 <u>Evidence-based decision making and healthcare managers</u>

The introduction of EBM is widely regarded as having generated improvements, and some, like Thyer (1995), are suggesting its applicability to a much wider audience. The increasing demand that managerial, as well as clinical decisions within the healthcare services are evidence (or research) based appears to reflect Rich's (2001) belief that scientific knowledge has come to be viewed as a unique and superior form of knowledge, 'because it offers a set of rules for inquiry which promises precision and the hope for overcoming systematic bias and human error' (p xii). Thyer (1995, p. 97) expresses his concern that pycho-social interventions are currently offered which have no credible degree of empirical support. He suggests that we should be asking, 'Which is the best known (in the scientific sense) treatment for disorder X at present?' He is proposing, of course, that science does offer a superior way of 'knowing' or making sense of the world. He goes on to say:

'A broad-based commitment to empiricism and the science-practitioner model of training is seen as a viable counter control to the intellectual Luddites currently making their voices known in all the mental health professions, those espousing a return to phenomenology, constructivist "ways of knowing", and a repudiation of quantitative research in favour of so-called qualitative approaches to understanding.' (p. 97)

Walshe and Rundall (2001, p.429) note that, 'the leaders and managers of health care organisations, while often doing much to encourage clinicians to adopt an evidence-based approach to clinical practice, have been slow to apply the ideas to their own managerial practice.' In a similar vein, Muir Gray (1997) posits that, at present, many healthcare decisions are based principally on values and resource availability, what he terms 'opinion-based decision making', with little attention being paid to evidence derived from research. Whilst accepting that values and resources will always be important considerations, he asks that equal emphasis be placed on research evidence.

An evidence-based approach could potentially bring about improvements in managerial practice, at both operational and strategic levels, through the following mechanisms:

1. By encouraging the development of an explicit, testable statement about 'what's going on', managers' implicit beliefs are made explicit, and the evidence for them can be examined.
2. By providing a framework, or quality filter, through which information to support or refute these beliefs can be obtained and critiqued, and new information generated and shared.
3. By identifying the skills which enable managers to put this framework into operation. In effect, learning how to learn.
4. By encouraging an evaluation of the intervention's success, thereby adding to the knowledge base.

A further advantage of adopting an evidence-based approach is that it is likely to produce more challenges to organisational and political bias because there is less reliance on 'political' knowledge and unchallenged heuristics. Leicester (1999, p.6) writes, 'we should be excited by the unprecedented opportunities now for evidence to influence policy. Technological advance is giving us new opportunities to get to grips with complexity...There is now a capacity for instant information gathering and analysis which makes all policy into a continuous real-time experiment.'

This drive for an evidence-based approach stems primarily from the NHS R&D strategy to secure a knowledge-based health service in which clinical, managerial and policy decisions are based on sound and pertinent information about research findings and scientific and technological advances. ....maximising the effectiveness, efficiency and appropriateness of patient services. (DoH, 1991)

Throughout the last two decades the importance of research in guiding healthcare practice has been repeatedly stressed (Department of Health, 1993a 1993b UKCC, 1993). It has recently gained even more urgency with government initiatives seeking greater effectiveness and efficiency in healthcare.

The Health Information Research Unit at McMaster University outlines the differences between clinical policy formulation and health care policy formulation. For clinical policy formulation, one considers (in equal measure) the patient's circumstances, their preferences and the evidence. With health care policy formation one considers (again, in equal measure) resources and options, values and the evidence. Colyer and Kamath (1999) note that whilst the National Health Service Executive (NHSE) does not provide an explicit definition of evidence-based practice, they go on to state that, ' ...there is explicit and frequent reference in the (NHSE) literature to the cost-effectiveness within EBP.' (p. 189) The authors also note that a 'residual bureaucratic culture in the NHS is likely to hamper severely the successful internalisation of evidence-based practice.' The implication is that evidence-based practice cannot thrive where there is a reluctance to change *established* custom and practice.

Concerns have been raised more generally regarding the applicability of evidence-based decision making by clinical practitioners, to more general management decision making. Walshe and Rundell (2001), for example, suggest that the culture, research base and decision making process of clinical practice and of healthcare management are different in many ways. They highlight the key differences between managers and clinicians, which may militate against the use of evidence-based practice for the former. The authors conclude, however, that there is certainly scope for making better use of research evidence when deciding how to organise, structure, deliver or finance health services. They suggest that it is necessary to foster a climate of 'learning through research', and to change managers' attitudes towards research evidence and the research process. Presently, however, we understand little about general managers' attitudes in this respect.

As more professionals are being urged to adopt this approach (for example in social work, education, human resources etc.) it seemed timely to explore in greater detail the perceived costs and benefits of evidence-based practice, and to gain a better understanding of those factors which promote or work against such an approach. Whilst much work has been done within the clinical arena, little is known about healthcare managers' opinions of evidence-based decision making, the extent to which they have adopted such an approach, what they believe to be the benefits and disadvantages, as well as better understanding those factors which might prevent or promote the use of research evidence in their own decision making.

There are three separate but related issues to consider in the research:

- To better understand the variables that predict a research (evidence) based approach to decision making.
- To identify the circumstances under which the strength of the predictor variables differ.
- To explore the extent to which such an approach is perceived to generate improvements in the workplace.

The next section discusses the literature which identifies these varables and considers the theory behind their proposed relationship with research seeking and utilisation. Initially, however, it is important to return to the issue raised earlier concerning EBM's foundations within the paradigm of rational decision making.

2.3 Rational Decision Making

According to theories of rational decision making (Allison 1971 , Braybrook and Lindblom 1972, Majone 1989, March 1988 and March and Simon 1958) a person is a rational actor when s/he is engaged in the process of 'optimising' his or her expected utilities (goals) by deciding upon the course of action which will provide the greatest payoff. Decisions about whether to perform a given behaviour are said to involve a cognitive process, whereby the individual identifies all of the possible options and the consequences of each, assesses the desirability and the likelihood of each consequence, and combines the evaluations of desirability and likelihood into a decision rule. Subjective Expected Utility (SEU) is the outcome of this cost-benefit analysis. The more positive the judgment of SEU, the more likely the individual will be to engage in the behaviour. Information has an integral role in the decision making process as the individual is assumed to engage in a comprehensive analysis of each alternative course of action. One uses information to reduce uncertainty.

Such theories been criticised for their emphasis on rationality to the exclusion of other perspectives (Furby and Beyth-Marom, 1992). It is assumed that the decision maker has a known set of alternatives from which to choose, contemplates all possible alternatives, understands the consequences of each, can assign a numerical measure of liking to any and all consequences, and can assign probability estimates to each (Simon, 1986). Yet, as Simon acknowledges, studies of decision making in the real world suggest that not all alternatives are known and not all consequences are considered. Furthermore decision makers frequently have inconsistent and incomplete sets of goals. Whilst decision makers may attempt to be rational they are almost always constrained by limited cognitive capabilities and incomplete information.

This school of thought suggests that decision-making is characterised by organisational routines or heuristics. These are procedures developed through individual experience, or built up by the organisation, which enable one to 'short-cut' the decision making process. It is clear that there are limits to human rational capabilities. Simon (1976) speaks of 'bounded rationality', which recognises the limits of human capabilities, and the costs involved in following a rational strategy. He suggests that people do not strive for maximum results; rather they are satisfied with a sub-optimal situation, which aims to find a cost-benefit trade off. The decision maker has formed some aspiration as to how good an alternative s/he should find. As soon s/he discovers an alternative for choice meeting his level of aspiration, he terminates the search and chooses the alternative. This 'satisficing' behaviour consists of ascertaining a course of action that is good enough in view of the intended objective or the current level of aspiration. Bounded rationality theories, therefore, concede that the process of information gathering, and decision making, must be within the limits of resources and cognitive abilities.

Choo (1996) considers the bounds that limit the capacity of the human mind for rational decision making:-

-the individual is limited by mental skills, habits and reflexes.

-the amount of information and knowledge possessed.

-by values or conceptions of purpose which may diverge from organisational goals.

He goes on to suggest that, as a consequence of such bounded rationality, the organisational actor behaves in two distinctive ways when making decisions. Firstly, s/he satisfices, secondly, s/he simplifies the decision process – following routines and applying learned rules of thumb in order to avoid uncertainty and reduce complexity.

Heracleous (1994) considers the rational decision making model and argues that it neither describes actual decision making processes nor can be used as an adequate guide to effective decision making as it ignores potent social, political and cognitive influences. He suggests that the main assumptions of the model are, in practice, unrealistic, and offers an alternative framework, emphasising cultural, structural and processual factors, as a more useful guide to effective decision making. He suggests that root causes of organisational problems are frequently misconceived and that the search for new information is largely informal, qualitative and conditioned by the organisational paradigm, alternatives being evaluated on past experience and managerial judgment rather than formal analysis. Power and politics descriptions of decision making (Pettigrew, 1973: Pfeffer, 1992) emphasise that, in organisations, it is those with power whose views often prevail in decisions, irrespective of their rationality or how beneficial they are to the company. From this perspective, we might expect to find that evidence-based practice has had little impact on *decision making* in practice.

Garbage can descriptions (Cohen *et al*, 1972) of decision making emphasise their essentially irrational nature: the information taken into account, the choices considered, all being determined by chance events - who happens to be involved, and what is on their mind at the time. This being the case, again one might expect that encouraging an evidence-based approach to decision making would have little impact.

Theories of rational decision making are also said to neglect social influences, which are considered only as indirect influences on behaviour that are mediated through SEU despite contradictory findings, e.g. Kuther (2002). Kuther suggests that SEU does not account for relations between social variables and the behaviour of interest, and that other explanatory variables may be necessary as mediators. Bauman *et al.* (1985), in their study of alcohol use, suggest that the subjective norm construct, from the theory of reasoned action, may act to mediate relations between social variables and the behaviour of interest.

The exponents of evidence-based decision making would, by and large, accept that managers operate within a framework of bounded rationality. They are suggesting that the ability to access reliable and valid scientific evidence reduces one's reliance on heuristics and thus generates improved outcomes. A decision-maker's productivity can thus be regarded as being highly dependent on what knowledge and information is available (or sought out) and what skills exist for processing that information.

Whilst it is possible to examine the extent to which managers perceive the *adoption of an evidence-based approach* has led to successful outcomes, it is important to bear in mind that the notion of 'success' and the outcomes we use to measure it, are themselves value-laden. Rutgers (1999, p. 32) posits, 'Whenever anyone urges us to 'be rational', we must ask ourselves which values and goals constitute the criteria for rationality-in-action.' Further Quintas (2002) reminds us that there are ethical issues over what actually counts as knowledge, which has tended to be very much controlled by institutions, professions and universities. He reminds the reader that knowledge takes many different forms and validity is not restricted to scientific knowledge.

2.4 Scientific knowledge v social construction of reality

The rationalistic assumptions of evidence-based policy have been challenged from constructivist and postmodern perspectives, for example, Berger and Luckmann (1966).

Sparrow (1999) considers the way in which managers construct knowledge and develop cognitive maps to guide their decision making, their 'theories-in-use'. The organisational culture will impact upon what the individual 'knows', as the individual absorbs this learning into his or her own belief system. This 'framework of beliefs' will guide how a manager will frame an organisational issue, identify what information is required, and what types of intervention are likely to be most effective.

Whilst EBM advocates generally accept the notion of bounded rationality, they would not accept the notion that rationality is relative to one's point of view. There is an emphasis upon understanding what counts as 'legitimate' knowledge. Kelly (1955, p. 129) notes that, 'any individual can prove or disprove only that which his construction system tells him are possible alternatives ... the construction system sets the limits beyond which it is impossible for him to perceive'. We are each constrained by the filtering effects of societal and organisational culture. Whilst Kelly emphasises the individual's 'construction system' or 'framework of beliefs', subjective metaphysics relies heavily upon culturally shared knowledge. Both approaches, however, point out the difficulties inherent in attempting to arrive at an objective 'truth', whether through scientific research or some other system of thought (or framework) through which we believe we understand and can predict how the world 'really' works. Fabian, 2000 (p. 362) writes, 'There remains considerable debate as to the extent that organisational research is a symbolic process of creating an agreed-upon reality, versus a disciplined testing of concepts mirroring facts in reality. But even if researchers were to agree on the ontological validity of an objective reality, epistemological standards for testing that reality could still be products of social construction processes.'

Similarly, Ginsberg (1979) emphasises the position that no knowledge is objective and that all knowledge can be regarded as a cultural and historical artifact. He claims that, 'all knowledge serves the interests of certain individuals and groups and is counter to the interests of others and consequently knowledge is inevitably political.' (p. 179) A number of researchers challenge 'scientific realism' on political grounds, suggesting that it promotes sectional interests: see for example, Brown *et al*, (2005). Certainly it is possible to see how this can be the case. My personal experience was that The National Institute for Clinical Excellence was heavily influenced by research undertaken by, or on behalf of, the pharmaceutical companies. It was they who had the resources to undertake large scale, longitudinal RCTs, particularly in mental health. Academics rarely had the funding to undertake such costly independent research.

In terms of healthcare research, Brown *et al* (2005, pp. 39-40) note that, 'As well as providing the conceptual apparatus, medical science and positivistic philosophy provide the guise of dispassionate neutrality,' and that researchers within this tradition, 'do not value diverse, alternative, human-based explanation (sic) of such things as "well-being", "belonging", "satisfaction", except inasmuch as these can be measured through rating scales.' They suggest that the ability to replicate findings is something of an illusion, that networks operating within science prevent problems and conflicts coming to light. Researchers, they believe, collude in ensuring that anything which threatens the status quo and commonly-held assumptions is never published. They write 'Are we presenting a picture of researchers as somehow lacking integrity, as formulating concepts, selecting theories and generating finding as they are expedient? The answer is a qualified "yes" (p. 72). They believe that evidence-based healthcare has curtailed the freedom of professionals, and prevented them acting upon their intuition. In addition, whilst they accept that it has provided patients with the most up-to-date care, it has removed the goodwill between doctor and patient.

The authors view interpretivism as an alternative to positivism and natural sciences approach to healthcare, with language theory central to this approach. They write, 'Unlike quantitative approaches, they (interpretivist frameworks) consider the constructedness of human society and how meanings are negotiated and built in relation to different settings...they tend to focus on functional explanations and on lived, natural experiences'. (p. 175) They recognise the oft-stated claim that such an approach can be seen to trivialise or relativise tragic events and that such an approach could be regarded as 'value-free'. Indeed it could be argued that they confirm these perceptions when they argue that illness is a social construct and may, on occasions, be 'pleasurable' to the patient. They write, 'What doctors know is different from what nurses know and differs again from the patient's experience. Postmodernism allows us to grasp this picture without feeling the need to establish "the truth".' (p. 242). The authors do not, however, suggest how such an approach can enable a healthcare provider to offer the patient an intervention that will make the latter feel better (however defined).

Having seemingly dismissed the role of the natural sciences the authors then suggest that 'While the randomised controlled trial may lend itself easily to the study of limited, definable treatment interventions it is less valuable when it comes to healthcare therapies, such as mental health care'. (p. 133) They note that the more general or complex the topic the less amenable it is to RCTs and systematic reviews. They appear to follow Weick (2001) in accepting a positivist approach *under certain conditions*, although, like Weick, those conditions are not clearly elaborated by the authors. For example, Weick speaks of the interpretation of actions and events as constructing reality, and yet finds it unproblematic to speak of a 'crisis' or a 'valuable role for managers', as if these constructs somehow exist outside of this sense-making process. Weick (1995) attempts to defend this ontological oscillation by suggesting that it is a reflection of the fact that lay people oscillate ontologically; the social scientist is simply reproducing this in his or her work. It seems surprising that Weick finds it acceptable to reproduce these errors rather than identify them and comment upon the consequences.

The interpretivist approach is not able to explain how the doctor might go about ensuring that the patient is given treatment which is likely to lead to increased well-being, nor (despite Weick's assertions) can there be any suggestions about how to avert an organisational crisis, or even that averting such crises and generating well-being could be regarded as a 'good thing'. Both well-being and crises are constructs which, according to this perspective, must be created, through language, on an on-going basis and which are neither good nor bad, right or wrong. Research, within this paradigm, can only concern itself with how meanings are generated and sustained. Eagleton (1995) noted that the postmodernists seem oblivious to the contradictions in their own position. He writes, 'In pulling the rug out from under the certainties of its political opponents, this post-modern culture has often enough pulled it out from under itself too, leaving itself with no more reason why we should resist fascism than the feebly pragmatic plea that fascism is not the way we do things in Sussex or Sacramento.' (p 69)

Critical realism is an attempt to highlight the ambiguity and errors inherent in much of the social constructionist ontology, and an approach, I would argue, most widely accepted by most managers. Critical realists begin from the premise that phenomena can exist independently of our construction of it, although they accept that one's access to this reality is always mediated by the framework of beliefs employed to make sense of the world. This is not to suggest, as postmodernists claim, that the entity is *brought into existence* by our reflection upon it.

Fleetwood (2005, p. 1) writes that, 'Organization Studies have recently been captured by a cultural, linguistic, poststructural or postmodern turn, the impetus for which has come from the ontological turn from a (naïve) realist ontology to a socially constructed ontology'. He suggests that the confusion in postmodern thought arises from not recognising or not specifying different *modes* of reality.

He identifies four modes:-

Materially real: Entities that would continue to exist even if humans disappeared (the moon, mountains, weather). The author notes that sometimes we do identify them, and they become conceptually mediated, but that does not alter their material status; they do not require this identification process in order to be brought into being. They would exist without our existence.

Ideally real: This refers to concepts such as discourse, language, signs, symbols, ideas, beliefs, meanings, opinions etc. This is the 'reality' that postmodernists are chiefly concerned with.

Artefactually real. What one might think of as materially real, although constructed by people: cosmetics, violins, computers etc). They would not exist without having been brought into existence by people, but they can exist without our identification of them. The author gives the example of such entities being conceptually mediated. Violins may be interpreted as musical instruments or table tennis bats, he notes, but unless we are prepared to accept that any interpretation is as good as any other, then we have to accept that there are limits to interpretation.

Socially real. This refers to social structures in general. The critical realist would argue that they may or may not be conceptually mediated, it depends upon the kind of social entity that it is, and that being dependent upon human activity does not mean that they do not exist independently of our identification of them.

Essentially, postmodernists confuse socially real entities with ideally real entities (the latter being theories or explanations of social entities) and assume that they are one and the same. They require human activities; they do not always require identification. The author writes, 'Class structures, patriarchal structures and tacit rules of the workplace do not require the activity of identification in order to be reproduced and transformed. We do not, for example, have to identify the constraints that gender places upon us, or others, in order for those constraints to be operational.' (p. 4). The notion of social construction is insufficiently nuanced (some would argue deliberately so) in that it does not differentiate between practical and discursive activities. Reed (2000) suggests that this downgrading of the extra-discursive is widespread in organisational analysis. Postmodernist discourse analysis, he suggests, 'tends to marginalize the non-semantic aspects of economic and political reality in that it is ontologically insensitive to material structuring and its constraining influence on social action.' (p 525).

Fleetwood notes that critical realists 'do not treat representations as unproblematic representations of an object – as naïve realists (i.e. positivists) often do. This is why, where appropriate, entities are referred to as *conceptually mediated.'* (p. 12) Note his use of the term 'mediated' rather than 'constructed'; postmodernists frequently confuse the two.

Within the EBA movement there is the belief that values are relevant to decision making but that they can be distinct from rational, scientific thought, rather than the lens through which the researcher constructs the phenomena under investigation. At the same time, there is recognition that better training and better measures are needed to overcome many of the criticisms levelled at this approach. There is also recognition that, for more complex problems, RCTs are not the answer, and that (for example) political factors and economic pressures, and they way such social phenomena are perceived, all play a role. Despite this, however, we begin from the premise that an external world exists over and above our interpretation of it, and that we can identify cause and effect and generate improvements, whether this be through an organisational intervention or a particular medication.

2.5 The Theory of Planned Behaviour (TPB) and the Theory of Reasoned Action (TRA)

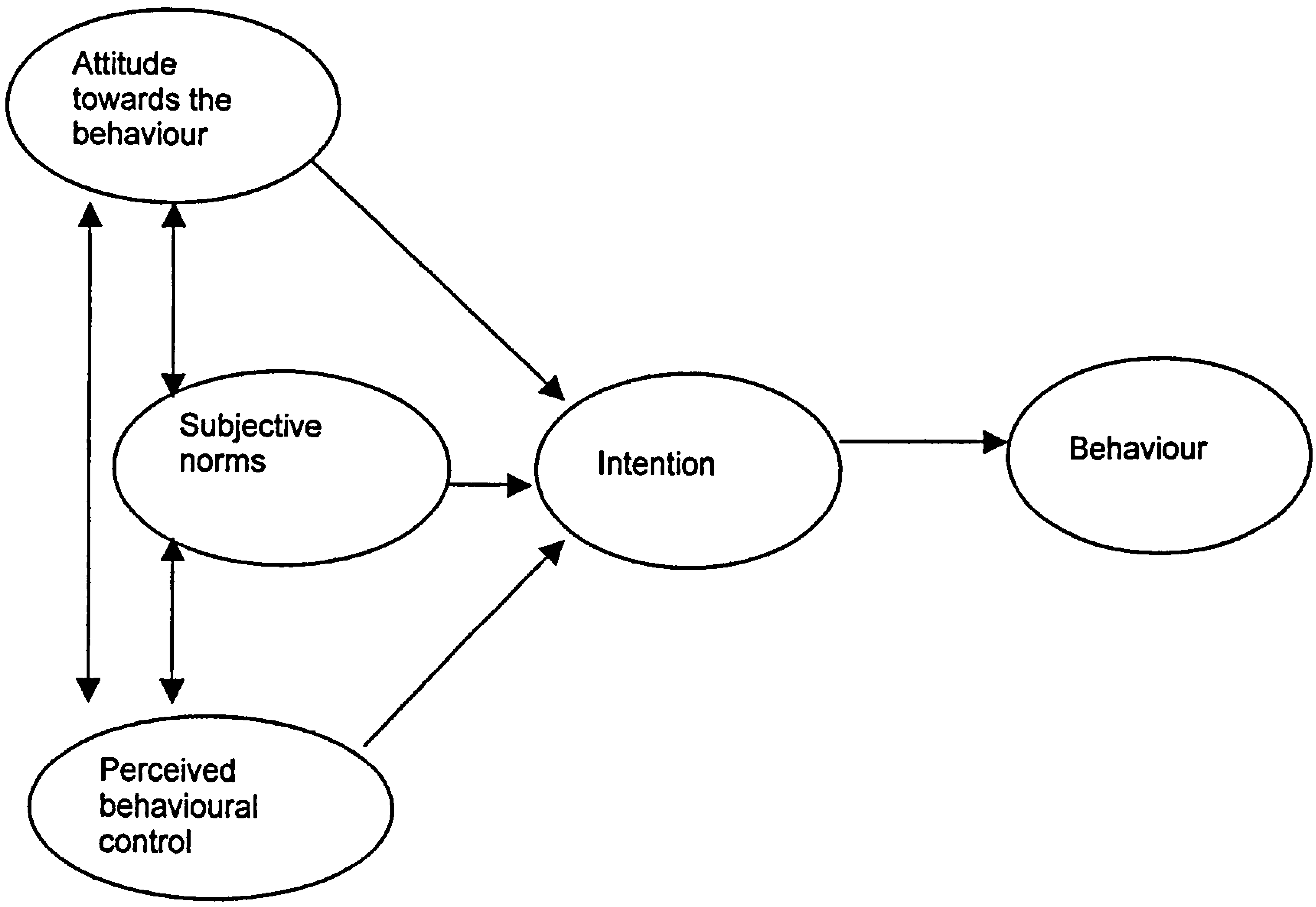
In their classical form, expectancy theories suggest that the motivation to perform a particular behaviour is a function of the individual's perception of the desirability of the outcomes (valance) and the perceived probability that these outcomes will be forthcoming (expectancy) (Vroom, 1964). Motivation will determine the level of effort that will be expended. The perceived ability to achieve the goal moderates the relationship between effort and actually performing the behaviour. The Theory of Planned Behaviour and the Theory of Reasoned Action are slightly modified versions of expectancy theory. The variables in expectancy theory may be correspondingly represented in the Theory of Planned Behaviour.

The Theory of Planned Behaviour is an extension of the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and was developed by Ajzen (1985) to explain goal-directed behaviours over which the individual does not have complete volitional control. One limitation of the Theory of Reasoned Action (TRA) is that it assumes that people have volitional control over their behaviours. Recognising the need to explain behaviours over which people may have little control, the TRA was expanded by including 'perceived behavioural control' (PBC). The Theory of Planned Behaviour states that behaviour is ultimately determined by an individual's intention to perform that behaviour. Intentions are, in turn, determined by the individual's attitude to the behaviour in question, subjective norms and perceived behavioural control.

Figure 2.1

(The variables contained in the model below will be elaborated upon and reviewed in Chapter 3 where their role in my own research will be discussed)

The Theory of Planned Behaviour. ***The model proposed by Ajzen***



Attitude towards a given behaviour arises from one's beliefs about the perceived advantages and disadvantages of performing the behaviour. Attitudes can be determined from behavioural beliefs based on: (1) how a person evaluates the believed consequences of a certain behaviour and (2) how confident the person is that the behaviour will indeed result in the believed consequences. Because of these two attitude determinants, this part of the theory is also called the expectancy-value model of attitudes (Fishbein & Ajzen, 1975). Subjective norms refer to the perceived social pressure to perform the behaviour and how concerned one is about such pressure. Perceived Behavioural Control (PBC) refers to the perceived ease or difficulty of performing the behaviour. It is concerned with those factors (e.g. ability, resources, or opportunity), which the individual believes are necessary to perform the behaviour, and the extent to which they perceive them to be available to him/her. Ajzen (1991, p. 183) defines behavioural control as 'people's perception of the ease or difficulty of performing the behaviour of interest ...' He acknowledged that PBC was derived from Bandura's (1977) concept of self-efficacy. Of course, perceived behavioural control is used as a proxy for *actual* control, generally because it is so difficult to obtain a measure of actual control. Only in those instances when perceived behavioural control reflects the reality of the situation, can it be a predictor of the behaviour in question. Ajzen notes that, to some extent, strength in one factor can compensate for weakness in another. For example, people who feel they lack the ability to perform a given behaviour may nevertheless attempt the action if they feel there is strong social pressure upon them to do so. Together, these three factors are assumed to capture the motivational factors that influence behaviour.

According to the theory, attitudes arise from the beliefs that people hold about the object of the attitude. One holds a positive attitude about a given behaviour because of one's belief that it is likely to bring about wanted rewards. These may be either intrinsic or extrinsic rewards. For example, I have argued that one might hold a positive attitude to research utilisation because such behaviour has been associated with enhanced promotion prospects or it may be that it has enabled one to deliver better results. It could also be the case that research utilisation is intrinsically motivating. I have hypothesised, for example, that people who are high in 'need for cognition' would have a more positive attitude to research because it is more likely to be an activity they enjoy for its own sake. Of course, a positive attitude may also partly reflect the individual's attempt to reduce cognitive dissonance and this will be discussed in more detail later. The model to be tested should enable one to identify the relative impact of these predictors on an individual's *attitude to research* and the behaviours of interest.

The TPB has a number of stated purposes:

-to predict and understand motivational influences on behaviour that are not under the individual's volitional control.

-To identify how and where to target strategies for changing behaviour.

-To explain virtually any human behaviour.

CHAPTER 3. THE LITERATURE REVIEW - (PART 2) -

THE VARIABLES TO BE INCLUDED IN THE MODEL.

3.1 Introduction

This chapter includes an overview of prior research, which considered the adoption of research-based practice, and identified those variables that appear to promote or militate against this practice. It will provide an overview of the way in which the hypotheses to be tested arise from an expansion of the Theory of Planned Behaviour. Each of the variables to be included in the model is discussed, and previous research evidence concerning the role of these variables in predicting the behaviours to be examined is reviewed. I conclude the chapter by discussing the outcome variables in greater detail, and prior research with respect to each.

3.2 Figure 3.1 The Theory Of Planned Behaviour The nonrecursive model to be tested:

3.2.1 *<u>The extent to which the variables included in the Theory of Planned Behaviour can predict the variables of interest.</u>*

It is possible to see, from the above model, the paths by which past behaviour might influence future behavior; these will be outlined in greater detail below. The model also tests causal relationships between the input variables in a way that Ajzen's model does not; he allows them to be correlated, but possible causal relationships are not examined. Finally, the above model recognises the fact that any initiative must be made sense of by the individual, and it is in this sense-making process, that the success or otherwise of an intervention can be determined. More will be said about this later when I discuss the extent to which evidence might inform practice, and the limitations, or scope, of this evidence in healthcare decision making. The literature review also pointed to additional variables that have been found to be influential in explaining research seeking, utilisation and/or evidence-based practice, and these will also be discussed below.

The first hypothesis I shall test is that:

Hypothesis

The variables identified in the Theory of Planned Behaviour will predict a high degree of the variance in *research utilisation*, *research seeking* and *evidence-based practice.*

Ajzen is aware that many years of research have failed to demonstrate that attitudes and personality traits are effective predictors of behaviour. Wicker (1969, p. 64) writes that, 'studies suggest that it is considerably more likely that attitudes will be unrelated or only slightly related to overt behaviours than that attitudes will be closely related to actions. Product-moment correlation coefficients relating the two kinds of responses are rarely above .30 and are often near zero.' Ajzen believes, however, that too little attention has been paid to the circumstances under which the behaviour takes place and the variety of moderating variables which impact upon the attitude to behaviour relationship. His TPB is an attempt to take account of these variables, and the questionnaire design he proposes is an attempt to be as specific as possible. He argues that to predict specific intentions (behaviours), equally specific attitudes must be measured. Perugini and Bazonni (2001) note that a meta-analysis of 142 empirical tests of the TPB found that the theory accounted for 40% of the variance in intention and 29% of the variance in behaviour, although understandably, the prediction of self-reported behaviour is superior to observed behaviour in terms of prediction.

Limbert and Lamb (2002) attempted to identify factors that influenced doctors' use of clinical guidelines, and considered the Theory of Planned Behaviour to be an appropriate model to guide this research. They found that attitude, subjective norm and perceived behavioural control explained up to 58% of the variance in intention scores (i.e. intention to use the guidelines). In the recursive model they employed, they found that subjective norm played the major role. They found, however, that different factors have greater or lesser relevance depending upon the group studied and on the behaviour of interest (specifically the level of difficulty associated with performance of the behaviour). Their research did not, however, consider the effects that prior performance of the behaviour (use of guidelines) had upon the predictor variables: this is despite the fact that past behaviour is often considered to be the best predictor of future behaviour. It is unlikely that any of the doctors surveyed would have no prior experience of using a variety of evidence-based guidelines in their work, to a greater or lesser degree.

3.3 Limitations of the Theories of Planned Behaviour and Reasoned Action

Although the Theories of Reasoned Action and Planned Behaviour have been shown to predict a variety of behaviours, they may be challenged on the basis of several criticisms. Firstly, the theory is based on the assumption that human beings are rational and that they make systematic decisions based on available information; unconscious motives and limited cognitive capabilities are not explicitly considered. There is, however, within the theory, an implicit acknowledgement of people's limited information processing and cognitive capabilities. Those factors which are likely to predict a high degree of the variance in the behaviour in question are identified and the focus of the individual's deliberations is narrowed.

The theory does not generally take personality and demographic variables into consideration. Although Fishbein and Ajzen believed that any other variable affecting the attitude-intention (behaviour) link exerted its effect via one or more of the terms in the model, in many tests of the model, additional variables have been included and found to increase the attitude-behaviour correlation. Some of these include: economic variables (Lynne & Rola, 1988) in predicting farmers' behaviour regarding soil conservation; moral values (Boyd & Wandersman, 1991) in predicting condom use; and academic achievement and friends' intentions (Carpenter & Fleishman, 1987) to predict college entry.

This leads to the second hypothesis:

Personality variables (i.e. *need for cognition*), *academic achievement*, *experience* and *grade* and environmental factors (*organisational learning climate* and *managerial influencing style*) would be important additional predictors to those identified in the Theory of Planned Behaviour.

A further concern relates to the questionnaire design proposed by Ajzen. The survey design suggested asks subjects to indicate how strongly they believe that a series of belief statements are true. These ratings are followed by an item asking the respondent to indicate how good or bad each belief consequence is. Research by Budd and Spencer (1986) suggests that this format creates a serious confound. They found, for example, that when the items are scattered within a larger questionnaire, the correlations between attitude and intentions are much lower than when all the ratings are presented together. The authors argue that the theory is part of an intuitive psychology of intention and that this intuitive psychology acts as a source of response bias, promoting consistency between responses. Whilst this problem is one found in common with all self-reports of behaviour, (Ross, McFarland, Conway & Zanna, 1986), it is a particular problem with the type of survey design suggested by the Ajzen, where the items related to attitude, subjective norms, perceived behavioural control and intentions are so specific and so obviously related. For example:

For me to walk on a treadmill for at least 30 minutes a day in the next month is (scale runs from harmful to beneficial, worthless to valuable etc)

Most people who are important to me think that I (should/should not rating) *walk on a treadmill for at least 30 minutes a day in the next month*

For me to walk on a treadmill for at least 30 minutes a day in the next month would be (scale runs from possible to impossible)

It could be argued that the outcomes from such a survey would not only be the result of response bias arising from a need for consistency, but also that the findings are rather trivial. Generally, we would like to be able to make predictions of behaviour from more general constructs or traits. In the model I have tested, I have included scales that prior research had found to be predictors of research utilisation, as well as additional variables that the Theory of Planned Behaviour suggests. So, whilst the Theory of Planned Behaviour served as a guide in selecting the variables of interest, the survey design relied on more specific constructs and scales, where possible, employing those which had already been validated in previous studies concerned with research-based decision making. In addition, measures of attitudes suggested by the theory lack specificity. My intention was to use a specific measure of attitude to research that had been validated in previous research.

It has been suggested that intention may not be needed as a mediator between attitude, subjective norm, and behaviour (Bentler and Speckart, 1979; Keefe, 1994 and Liska, 1984). There is evidence that subjective norms and attitudes often are related directly to behaviour. Bentler and Speckart (1979), for example, compared the theory of reasoned action with a second model, which included a direct link between attitude and behaviour. The second model, which allowed attitudes to influence behaviour directly, as well as through intentions, demonstrated a more adequate fit to the data than did the model based on the Theory of Reasoned Action. These studies indicate that attitudes and subjective norms are associated directly with at least some behaviours, suggesting that intention is superfluous. In the models I shall be testing, the predictors of research seeking and research utilisation are allowed to predict the behaviour directly.

As an aside, it has been suggested that the TPB works better for low self-monitors because these people are more likely to translate their attitudes into behaviour across a variety of situations. Self-monitoring refers to a stable individual difference (Snyder, 1974) in the tendency to vary one's behaviour in different situations. High self-monitors are sensitive to situation cues and tailor their behaviour, dress, and speech to the situation.

A further concern is that the theory assumes that the predictor variables are correlated, but that there are no causal relationships between them: yet it is not difficult to argue, for example, that a positive attitude towards a given behaviour could result in an individual developing the requisite skills needed to engage in that behaviour, thereby increasing their perceived behavioural control.

This leads to the next hypothesis:-

Hypothesis

Nonrecursive models will obtain improved measures of fit, as the recursive model (specified by the TPB) ignores causal relationships between the predictor variables, some of which will impact directly upon the behaviour, others via their impact on *attitude to research*.

In addition, the TPB considers the constructs employed to be unidimensional. Specifically, intrinsic and extrinsic perceived behavioural control (PBC) are combined into one construct. It may be that sub-factors within these global constructs behave quite differently within the model, but this is glossed over in the analysis, which fails to consider the measurement models within the overall structural model. This will be discussed in greater detail later in this chapter. Generally, the Theory of Planned Behaviour does not consider intrinsic and extrinsic control factors separately. Notani (1998) found, however, that familiarity with the behaviour in question moderated the relationship between perceived behavioural control and intentions such that PBC predicted intentions to perform familiar behaviours more than intentions to perform unfamiliar behaviours. The suggestion here is that experts have a greater awareness of the difficulties of performing a behaviour and have less optimistic estimates of perceived behavioural control. This relates primarily to extrinsic control factors; presumably the more one performs a behaviour the more one increases feeling of self-efficacy, so the suggestion is that extrinsic perceived behavioural control factors may behave differently in the model from intrinsic control/self efficacy.

Bunce and Birdi (1988) employed the TPB to predict doctors' intentions to request autopsies. They compared two groups, the first who had the authority to request an autopsy without justification, and the second (junior doctors) who had to justify their requests. For the group who did not have to provide justification for their actions, PBC did not predict their actions, yet for the second group PBC was a significant predictor of intentions. However, considering PBC as a unidimensional construct in this way, and ignoring the effects of past behaviour, leaves many questions unanswered. One might find, for example, that junior doctors who requested more autopsies became more aware of the external obstacles in their way, or, depending upon the environment in which they worked, the behaviour might have led to the belief that there were few obstacles to be overcome. So, depending upon factors in the environment (or organisational climate), one would expect that, generally, performance of the behaviour would lead to increased feelings of self-efficacy and mastery over extrinsic factors. I made the decision to separate out those factors external to the individual (time, access, authority) from critical appraisal skills, a measure of self-efficacy. Breslin *et al* (2001) were interested in how different aspects of PBC selectively influence adoption of innovations, but did no research in this area. I wanted to see if extrinsic and intrinsic control factors behaved differently in the model, particularly in terms of how they might influence future behaviour.

Hypothesis

The original model's use of broad constructs (assumed to be unidimensional) disguises the way in which sub-factors within these global constructs operate differently in predicting behaviour.

Finally, it could be argued that the theory fails to take into account the impact of past behaviour on future behaviour, via its impact on attitude development and beliefs about control and self-efficacy. (This criticism will be expanded upon later). It was my intention to test the following hypothesis:

Hypothesis

The recursive model will be overly simplistic, in that it does not predict how past behaviour might influence future behaviour via the following mechanisms:

Increasing skill level (self efficacy)

Improved *attitude to research*

Increasing views about mastery over external environment (*extrinsic PBC –time, access, authority*)

Via *perceived improvements*

- thereby over or under predicting the regression weights.

I am now going to review the literature relating to those variables that will be included in the models I shall be testing.

3.4 <u>The variables in the model. The variables related to the Theory of Planned Behaviour.</u>

<u>*3.4.1 Perceived Behavioural Control (PBC)*</u>

Notani (1998) examined the role of two measurement factors related to PBC: internal control factors such as perceptions of personal ability and external control factors such as perceived opportunities for performing the behaviour. The variables included in the model, which are related to the concept of perceived behavioural control, are: access, time, authority and the extent to which decisions made are non-routine/strategic. In terms of intrinsic, rather than extrinsic PBC, I have included two variables related to the skills required for evidence-based decision making. One variable allows the individual to score the extent to which they believe they have the necessary skills, and the second construct is made up of those items which have been associated with the effective implementation of research utilisation, and which have been included as part of the Critical Appraisal Skills programme (CASP)

Time, access, authority (What I have termed extrinsic PBC)

We know from work carried out using the 'Barriers Scale' (developed by Funk *et al*, 1991) that the items rated as great or moderate barriers to research utilisation were as follows: access to the relevant research evidence, insufficient time and lack of authority and/or facilities to implement the findings (Kajermo *et al*, 1997). Similarly McCleary and Brown (2003) reported that lack of time to read research was the most frequently cited barrier to using research in their study of pediatric nurses. Rokeach (1950) demonstrated how time pressures can inhibit creative problem solving, and Rruglansky and Freund, 1983 found that time pressures can also increase rigidity of thinking on work-related tasks.

Items were therefore included in the survey that identified the extent to which managers believed they had the tools (defined as; time, access and authority) to implement an evidence-based approach if they felt it worthwhile. It was hypothesised that these variables would predict both *attitude to research* and the adoption of an evidence/research based approach. It would need to be borne in mind, however, that people with a greater awareness and knowledge of research methods may also perceive fewer barriers (Kajermo, 1997). This would support the theory that past behaviour influences future behaviour via its impact on PBC.

Decision type (Extrinsic PBC)

How decision makers perceive the issues and problems they face in their work environments (e.g. familiar or unfamiliar) directly affect their use of information. As Patton (1978) observed, decision makers use information to reduce their uncertainty within an existing social context, particularly when facing unfamiliar policy problems. Rich and Oh (2000, p. 21) concluded that, 'when facing unfamiliar problems, decision makers tend to conduct a wide search of information beyond their own agencies.' Vakkari (1999) noted that the complexity of the decision is important in determining consequent information needs. As tasks become more complicated the information needs also becomes more complicated. Generally, when problems are familiar and unambiguous, decision makers are more likely to seek information from within their own organisation (Pollard, 1987). To generalise, for simple decisions, more basic information is needed, and it is generally obtainable from internal 'fact-oriented' sources that require little interpretation. There is little need to seek out research evidence if one's tasks are fairly routine and where answers exist within the organisational policies and procedures. The suggestion is, therefore, that strategic decisions are more likely to lead to research information seeking and utilisation. It may be the case, however, that finding applicable information is more difficult in complex situations, the research questions more difficult to define, and the information obtained more difficult to apply to the task situation: both of these apparently conflicting theories seem to have some merit. They appear to suggest that whilst one might expect that the need for research information increases as decisions become more complex, the perceived success of research utilisation in practice decreases in this more complex environment. This will be discussed in more detail when I consider the variable *perceived improvements.*

Critical appraisal skills (Intrinsic PBC)

Anderson (2001, pp. 215-216) questions whether critical thinking can be regarded as nothing more than, ' the desire to justify one's work by reference to something higher or greater than local practice, the desire to say something grander than this is the way we think in our neck of the woods.' She goes on to suggest that, 'Even if the priorities of non academics require them to make use of evidence and argument, their use of evidence and argument is always and already bent in the direction dictated by their local needs and priorities, not by the needs and priorities that academic work imposes.' She suggests that critical thinking is one amongst many 'ways of knowing', and that, furthermore, it has limited relevance outside of academia.

However, central to the practice of an evidence-based approach are the skills needed to critically appraise research. Critical thinking is, in essence, the process through which healthcare managers integrate information into their framework of beliefs; it is via this process that one is thought to be better able to understand 'what works'. That there is an objective reality which science enables us to access is not doubted within this framework. Davies and Nutley (2000) note that the purpose of evidence-based decision making is to equip people with the skills to learn, rather than with a collection of 'facts'. They suggest that the focus should be on teaching 'learning strategies', in essence, learning how to learn. It is widely believed that critical thinking is a core skill that should be widely taught to bridge what is termed 'the academic-vocational divide'. The generally held view is that critical thinking is a teachable skill. Certainly the developers of CASP are reliant upon this being the case.

Definitions of what these skills ought to be abound. Brown and Keeley (1990) define them as enabling people to react with systematic evaluation to what they have heard and read; Beyer (1988, p. 61) as, 'the process of determining the authenticity, accuracy, and worth of information or knowledge.'

Kuhn (1991) sees critical thinking as involving the abilities to:

- differentiate opinions (or theories) from evidence.
- support opinions with non-spurious evidence.
- propose opinions alternative to one's own and to know what evidence would support these.
- provide evidence that simultaneously supports one's own opinions whilst rebutting the alternatives.

- take an epistemological stance which involves weighing the pros and cons of what is known.

She provides data indicating that none of the above abilities is widespread in the adult population, and that the problems are especially acute amongst individuals whose post-school education, if present at all, is restricted to vocational instruction. She also found that awareness of domain knowledge is insufficient to generate cogent critical reasoning. In a similar vein, Kharbanda and Stallworthy (1990) point out that many organisations stipulate that the capacity to think is a core management competence, and yet claim that the majority of managers are neither trained nor expected to demonstrate this trait.

Girot (2000) undertook research to determine what relationship, if any, existed between critical thinking and decision making in practice. She concludes that, 'no relationship could be found..... suggesting that more work needs to be done to look carefully at both critical thinking skills and decision making in practice and the tools used to measure these.' (p. 1365) She did find, however, that people exposed to the academic process were significantly better at decision making than their non-academic colleagues.

There is a suggestion (Champion and Leach, 1989; Harrison *et al*, 1991) that skills training is likely to improve attitudes towards research, and that these positive attitudes will lead to greater utilisation of research findings in the work environment. Rich (2001) concluded, however, that his results revealed little difference between users and non-users (of scientific research) relative to their background in research methodology. One reason for this may be, as Posner *et* *al* (1993) theorised, that students must reorganise or replace their incomplete knowledge structure. It would seem that certain knowledge structures could inhibit learning. A consistent finding is that students who believe in fixed intelligence, in simple knowledge and in quick learning, tend to avoid obstacles, resort to ineffective strategies and to exhibit maladaptive behaviours in the face of difficulties and challenges (Qian and Alvermann, 1995).

Related to this, I was particularly interested in discovering the impact of the NHS's Critical Appraisal Skills Programme (CASP) on research seeking, its utilisation, and the impact of this approach in terms of work-related outcomes. I had met with Dr Muir Gray to discuss the work of the CASP team. He is Director of the National Electronic Library for Health and of the National Screening Committee and Project Manager for the National Public Health Network Project. He was instrumental in setting up the Centre for Evidence-Based Medicine in Oxford, and developing the CASP programme. The stated aim of CASP is to empower individuals and groups by helping them identify, and use, good quality evidence to support decisions in practice. Muir Gray has stated that he believes the future of critical appraisal skills and evidence-based practice is in the wider context of knowledge management. Muir Gray outlines the skills required of a practising evidence-based decision maker:

- an ability to define the criteria of interest (effectiveness, safety etc).
- an ability to find articles on the subject of interest.
- an ability to assess the quality of evidence.
- an ability to assess the generalisability of research and its appropriateness in the particular context of interest.

He believes that these are the knowledge management skills necessary for the provision of healthcare in the 21st century. Thus, I was interested in exploring how far such skills would explain an evidence-based approach in an organisational context.

Perceived skill level (Intrinsic PBC)

The critical skills respondents were questioned about in my own survey, were those covered during the CASP training programme and which were considered important in terms of enabling an individual to seek out and use research evidence. Certainly they have face validity, although there is little evidence to support their importance in predicting research seeking and/or utilisation. I therefore also considered it important to ask about respondents' own views of their skill levels. They were asked to rate the extent to which they believe they have the skills needed to appraise research evidence. It was felt that the person's perceptions of their own skill level (with respect to the skills they themselves deemed necessary) would be a more accurate predictor of research use, consistent with the Theory of Planned Behaviour, than the scale employed in the survey to measure these skills, and would serve as a useful check that the skills detailed in the survey were the one's which people related to when considering *internal perceived behaviour control.*

Hypothesis

***Perceived Behavioural Control* (both *intrinsic* and *extrinsic*) will predict both *attitude to research* and the adoption of an *evidence-based practice* and *research utilisation*, in each of the sub-groups.**

3.4.2 Subjective norm

The variables included here are: the extent to which the respondent believes they are encouraged and rewarded for adopting an evidence-based approach; the extent to which promotion is linked to the adoption of an evidence-based approach (I have also asked about respondents' ambitions with respect to recognition and promotion); and the extent to which others in the respondent's team and organisation have adopted an evidence-based approach in their work. I have not asked about whether respondents feel motivated to comply with their team behaviour/norms. I have made the assumption that in an organisational context people are rarely given the opportunity not to comply with these expectations and therefore team norms will be a strong predictor regardless of one's personal opinions.

Organisational encouragement/rewards (subjective norm)

An association had been found between the extent to which employees feel they are valued or cared about by their organisation and their performance and innovation at work (Eisenburger *et al*, 1990). Both the Theory of Planned Behaviour and Expectancy Theory would suggest that research utilisation is more likely when the individual is rewarded for the behaviour, and where that reward is valued. Expectancy theory would lead us to expect that if an employee believes that certain behaviours will lead to approval and/or rewards (or alternatively, disapproval and sanctions) from their colleagues and manager then he or she will behave in a way which leads to the achievement of desired outcomes, or avoids undesired outcomes. This assumes, of course, that they believe they have the resources to achieve some level of success in this endeavour.

As predicted by the above-mentioned theories, Rich and Oh (1996) found that organisational incentives indirectly influenced decision maker's use of information. Rich (1997) also specifically suggests that through incentive schemes, organisations can control and facilitate use of specific information and specific transmission channels. Rainey (1983) found that the lower expectation of rewards/incentives for good performance accounts in large measure for public managers' lower motivation.

There is an issue, however, around the extent to which extrinsic rewards might undermine intrinsic motivation. The history of Self-Determination Theory can be traced to research undertaken by Deci (1971, 1972) showing that extrinsic rewards such as monetary payments can undermine people's intrinsic motivation for the rewarded activity. If a reward - money, awards, praise, etc. - comes to be seen as the reason one is engaging in an activity, that activity will be viewed as less enjoyable in its own right. This finding was important as it was the first evidence that wanted outcomes such as rewards could have the unintended consequence of decreasing intrinsic motivation due to the fact that they can limit people's sense of self-determination, the explanation being that people come to feel controlled by the rewards. Deci *et al* (1999) undertook a meta-analysis of 128 experiments that explored the effects of extrinsic rewards on intrinsic motivation.

The authors report that the results are 'clear and consistent'; they found that tangible rewards had a significant negative effect on intrinsic motivation for 'interesting tasks', across a variety of situations and groups. These findings are also consistent with cognitive evaluation theory (CET), which posits that extrinsic rewards may detract from intrinsic motivation where they suggest that the person does not have a choice about performing the task. The authors conclude, 'the style of administering tangible rewards also influences their effects. According to CET, rewards given informationally tend to have a less negative (or more positive) effect on intrinsic motivation than those given controllingly' (p. 652.) By this they mean that rewards should be given to acknowledge good performance but should allow choice about how to undertake the tasks whilst minimising the use of an authoritarian style. They also suggest that the person providing the reward should emphasise the interesting or challenging aspects of the tasks. Of course, it can also be the case that, when providing rewards for performance, people become demotivated when the size of the reward is less than expected, or less than that of others whom they believe to have performed comparatively. Their findings would suggest that the process of providing tangible rewards must be very carefully managed if it is not to have a detrimental effect on intrinsic motivation. There is still, however, considerable controversy about whether giving tangible rewards does, in fact, reduce intrinsic motivation.

In addition, Deci *et al* (1999) found that verbal rewards (i.e. positive feedback) had a significant positive effect on intrinsic motivation. They suggest that this is because the verbal rewards are typically unexpected and because they provide an affirmation of competence. It follows, they argue, that if people engage in interesting activities specifically because they expect to get verbal rewards, that the rewards would then undermine intrinsic motivation.

Hypothesis

***Extrinsic rewards* will be a negative predictor of *attitude to research* in all sub-groups, and will be a stronger predictor for those people in lower-graded posts (where they have less control over achieving the objectives related to those rewards).**

Aspirations (subjective norm)

Expectancy theory leads us to expect that individuals with ambitions for advancement would be more likely to adopt a research-based approach to decision making in those environments where such behaviour is expected and linked to recognition and promotion. The theory would suggest that the outcomes from performing the behaviour would have greater valance for these individuals. I have hypothesised that a desire for promotion will be a far stronger predictor of research utilisation for those people who work in an environment where such behaviour is linked to promotion. Similarly, people who described themselves as aspiring to obtaining professional recognition and achievement would be expected to utilise research evidence in their work, where they believed that such behaviour resulted in recognition and reward from their employers, (all other things being equal).

Hypothesis

***Aspirations* will be a direct predictor of the behaviours modelled for each of the sub-groups, and will be a stronger predictor where these behaviours are expected (i.e. in the clinical group).**

<u>*Team use of research evidence (subjective norm)*</u>

I could find no research that considered the extent to which team adoption of a research-based approach impacted upon the individual's research utilisation, yet the Theory of Planned Behaviour would suggest this is a key predictor. The majority of studies concerned with research utilisation considered individual factors in isolation from environmental factors, in terms of their ability to predict utilisation, or enquired about perceived organisational barriers to the adoption of this behaviour. The survey I developed asked respondents about the extent of research utilisation in their immediate team as well as in the wider organisation. It is hypothesised that this will be a key determinant of whether the individual adopts a research-based approach in his or her own decision making. Not only is there likely to be an expectation that such an approach will be adopted, but it is reasonable to assume that any organisational barriers to this adoption will be fewer if such behaviour is the norm. This external pressure to behave in a consistent fashion with other team members is likely to be a strong predictor of research utilisation by the individual regardless of their attitude to research.

If the survey design proposed by Ajzen had been used, respondents ought to have been asked about the extent to which they felt significant others in their work environment approved or disapproved of research utilisation, and the extent to which they were concerned about these opinions. Generally, subjective norms have been a relatively poor predictor of behaviour. One explanation for this is based on the distinction between normative (injunctive) and informational (descriptive) social influence. Injunctive norms such as subjective norms in the TPB reflect perceived social pressures in relation to the performance of a certain behaviour. Here, the motivating force is one's expectation of gaining wanted social approval. Descriptive norms on the other hand reflect the respondents' perceptions of other people's behaviour. The motivating force is suggested to be the expectancy that if most others are doing it, then it is probably a good thing to do. Some authors have suggested that there is a sound basis for considering the relevance of descriptive norms in the Theory of Planned Behaviour (Conner and McMillan, 1999; Sheeran and Orbell, 1999).

Fekadu and Kraft (2002) draw on self-categorisation theory to explain the process of social influence. Firstly, people define themselves as a member of a certain group or social category. Secondly, they learn what the stereotypical attitudes and behaviours (norms) are in that group and thirdly, they assign those attitudes to themselves. Hence they turn out to play an important role in defining oneself as a member of a particular social group or category. Fekadu and Kraft's own research supports that of earlier studies in demonstrating the importance of salient other's behaviours. Furthermore, it is suggested that social norms influence the attitude to behaviour relationship in that people are more likely to engage in behaviours that are consistent with their attitudes if the normative climate supports such attitudes.

In my research, in an organisational setting, I would suggest that there would be a further motivating force i.e. the expectancy that there will be sanctions if one fails to comply with what others are doing and what is therefore generally expected within the group. As a general rule employees have little choice about the colleagues with whom they work, even though they will not necessarily be the type of people whose attitudes and behaviours they would naturally align themselves with. This is not to suggest, however, that the norms of the team will not influence their behaviour; on the contrary, there are likely to be sanctions if one fails to comply. There is a strong extrinsic motivating force to comply. For example, Schachter's (1951) analysis of group rejection of a nonconformist prompted research into the consequences of nonconformity. These studies have shown that a nonconformist is generally less well liked by others in the group, in some cases resulting in rejection and loss of status. In an organisational context this may also result in demotion or loss of one's job.

I hypothesised that descriptive social influence of this nature would impact upon behaviour, but would not necessarily have a direct impact upon respondents' attitude to that behaviour. The behaviour must, to a large extent, be performed regardless of one's personal attitude; the individual team-worker is frequently compelled to comply. However, if the individual has social pressures from outside of their immediate team, ('salient others' in the TPB) then these may reduce the impact that one's team can exert; similarly, if one has strong intrinsic motivation to behave in a particular way, then again, the impact that the team can have may be weakened. Marlatt *et al* (1995) found that increased self-efficacy (which is likely to be related to engaging in higher levels of professional development), reduces the impact of social pressure in determining people's behaviour. I am suggesting that people whose intrinsic motivation to improve their performance is high, rely less on social pressures to engage (or not engage) in the behaviours examined.

Hypothesis

***Team utilisation of research* will be a predictor of the behaviours in all of the sub-groups, and will be a stronger predictor where there are fewer social pressures outside of the team to engage in these activities, (i.e. in the non-clinical group). *Team utilisation of research* will also be a stronger predictor of the behaviours where people undertake higher levels of Continuing Professional Development (CPD).**

Current use by Healthcare Managers (subjective norm)

I am concerned here with the impact of the behaviour of significant others, with whom respondents have chosen to align themselves by voluntarily becoming a member of the professional group represented by the Institute of Healthcare Managers. Normative influences prompt individuals to feel, think, and act in ways that are consistent with those of their chosen reference group(s). These standards, or norms, describe what behaviours should and should not be performed. Such people are a valuable source of information about the world; the majority is influential because we assume that a large number of people cannot all be wrong. If we believe that healthcare managers generally utilise research evidence in their decision making, then we are predisposed to believing that the majority is likely to be correct. This in turn may influence our own attitude to research utilisation.

The extent to which the group can exert pressure in terms of the individual's need to conform to group norms is, however, fairly limited. In addition, whilst we may be more likely to concur with their views regarding a particular behaviour, whether or not this concurrence then encourages us to perform that behaviour is liable to be determined by a wide variety of other factors. The TPB identifies what those other factors might be: lack of time, lack of organisational support, lack of skills, etc. There must also be a willingness to exert effort to perform that behaviour, particularly in the absence of immediate external motivation. So, whilst research utilisation by one's team can be expected to lead directly to research utilisation, regardless of its impact on attitude, beliefs about the extent of use by people in one's reference group is likely to have an impact on research utilisation indirectly by encouraging a more positive attitude to that behaviour. In the absence of extrinsic motivators, there is an extent to which the individual must be convinced that it is 'a good thing' to adopt such an approach.

In the analysis we would therefore expect to find that team use of research evidence has no direct impact on attitude to research once we control for individual utilisation of research evidence; attitude is affected only via the individual's adoption of such an approach themselves. On the other hand, we would expect to find that the stronger one's belief about the extent of research use amongst healthcare managers, the more one would adopt a positive attitude to research, and that this would affect research utilisation and evidence-based practice indirectly, through this impact on attitude. It was hoped that the inclusion of this variable would also serve to 'identify' *attitude to research* in the analysis. (This will be discussed in greater detail in chapter 4)

3.4.3 Attitudes

Allport (1935, p. 810) provided an early definition of attitudes:

'An attitude is a mental or neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related.'

Attitudes are evaluations of something: like/dislike; good/bad etc., and they must be relevant to the behaviour in question. Some authors (e.g. Gleicher *et al*, 1995) have suggested that attitudes are made up of three components:

Affect. Essentially how we feel about the subject/behaviour in question. It is the evaluative element in an attitude, on the basis of which the attitude holder judges something to be good or bad.
Behaviour. This is the consideration of past, present and future behaviour towards the subject or behaviour in question.
Cognition. Essentially any bit of information, fact or knowledge relevant to the subject or behaviour of interest. They are basically beliefs about the subject/behaviour.

It is easy to see how these components would be impossible to separate out. For example, Bagozzi and Burnkrant (1979) suggest that there are only two components involved: affect and cognition. They work simultaneously to influence an intention to behave or overt behaviour itself. An alternative approach is to consider these as three distinct dimensions: beliefs, attitudes, and behavioural intentions.

Attitudes have been an important focus of study largely because of the belief that they can predict behaviour. The results here are mixed. Part of the problem is one of temporal instability. The longer the time frame between the attitudinal measure being taken and the observance of the behaviour, the greater the number of things that will have occurred in the interval to cause the inconsistency. Another issue is how closely the attitudes are related to the object/behaviour of interest and the strength of the attitude. Strength is determined by extremity, confidence, accessibility and non-ambivalence. (Craig *et al*, 2000).

We would expect that, as research seeking and utilisation demands effortful, systematic processing, a high degree of motivation would be required to translate a positive attitude into actual behaviour. To the extent that this behaviour is, at least in part, under the individual's control, one would expect that a positive attitude to research would be a predictor of research utilisation where the individual is sufficiently motivated to engage in this behaviour, or the organisational climate encourages the behaviour, and reduces obstacles in the way of engagement in the activity.

Hypothesis

Attitude to research **will be a direct predictor of the behaviours to be modelled in all of the sub-groups, but will be a stronger predictor when we consider respondents working in the clinical arena where such behaviour is**

expected and encouraged. It will also be a stronger predictor where individuals engage in higher levels of CPD (as higher levels of intrinsic motivation will provide the drive to translate beliefs into action).

Hicks *et al* (1996) noted that, whilst many explanations have been given which implicate the role of structural, organisational and informational barriers to integrating research with practice, less attention has been focused on the individual and psychological contributions. Their research found that the majority of the primary health care professionals studied perceived research as being unimportant and peripheral to their jobs, and the responsibility of other health care professionals. Moreover, the subjects' understanding of research and its methodologies was discordant both within and across professional groups. They conclude that 'fundamental and deep-seated attitudes which are resistant to research, may be a contributory factor to the persistence of ritualistic, non-evidence-based care.' (p. 1033) The Theory of Planned Behaviour would suggest that a positive attitude to research would be a significant predictor of research seeking and utilisation. The model developed would test this hypothesis.

Recent studies in the UK, which have looked specifically at attitudes of practitioners to research, (Veeramah, 1995; Hicks, 1995 and Meah *et al* 1996), used a questionnaire based on a Likert-type instrument developed by Champion and Leach (1989) Hicks (1995) developed a 13-item attitude scale. Estabrooks *et al* (2003) examined a number of studies which utilised this scale in research which explored individual determinants of research utilisation amongst nurses. The variables considered in the research were: beliefs and attitudes, involvement in research activities, information seeking, professional characteristics, education and socio-economic factors. They concluded that, apart from attitude to research, there was little to suggest that any individual determinant influences research utilisation. It is also fair to say, however, that their research identified a number of methodological problems in the studies they examined. Specifically, they found that only 25% of the studies addressed inter-correlations among predictor variables, and the self-reported use of research was measured by scales with acceptable levels of reliability only 50% of the time. They were also concerned that sample sizes were frequently inadequate and that, in a small number of cases, anonymity of respondents had not been protected.

Nevertheless, *attitude to research* appeared to be a sufficiently important, well researched and validated scale to justify its inclusion in the present research. (See also Champion and Leach, 1989, Lacey, 1994, and Hicks, 1993). Dyson (1996) suggested that the provision of appropriate research education enabled nurses to develop their knowledge and understanding of research thus improving their attitude to research, enhancing their ability to apply findings in practice. She notes, 'It could be anticipated that having adopted a more positive attitude towards research, students.... would be more likely to utilise research findings.' (pp. 610-11). Rich and Oh (1996) suggest that attitude toward information also indirectly affects information utilisation through either the amount of information obtained or through other variables. They found that decision makers' negative attitudes towards social science research also influenced their use of information. They suggest that decision makers' perceptions of decision making are more important in accounting for research utilisation than organisational factors.

Parahoo *et al* (2000) note that whilst the current emphasis on evidence-based practice has focused attention upon research activities, studies have tended to concentrate on general nurses and midwives. Her own large-scale study of attitudes to research amongst nurses in Northern Ireland received 1368 responses (52.6%) The findings show that although respondents held positive attitudes to research, only about a third reported utilising research frequently, and less than 40% reported that they had implemented research findings in the two years prior to the survey, although this was higher for graduate nurses. The scale used by Parahoo, and which was developed from the instrument used by the National Board for Nursing Midwifery and Health Visiting for Northern Ireland (NBNI), is the scale that I have adapted to use in this research. The instrument was deemed appropriate to use in McCance's (1995) study and it shares some items in common with Veeramah's (1995) questionnaire and Hick's (1995) scale. Parahoo states that the scale was scrutinised for content validity by a panel of experts experienced in research. The author does not report undertaking any exploratory or confirmatory factor analysis of the scale; response rates for each item are included in the paper.

Saha *et al* (1995) explored respondents' (School Principals) general attitudes regarding research knowledge, on a 5 point Likert scale ranging from 'of no value' to 'invaluable' (mean 3.9, where high= 5 and low= 1). The authors found that Principals who were seriously committed to their jobs as professionals were more likely to view research knowledge positively. Surprisingly, Delin (1994) found that medical students' attitudes to research were very similar to those in other occupational groups (dentistry, occupational therapy, physiotherapy and nursing) which is rather surprising, as medicine has a long research tradition, whereas allied health professions have only recently become involved in research-based decision making. He reported that education in research methods played a far greater role in determining attitudes to research, than did occupational group.

There is a suggestion (Champion and Leach, 1989; Harrison *et al*, 1991) that value skills training is likely to improve attitudes towards research, and that these positive attitudes will lead to greater utilisation. Rich and Oh (1996) suggest that one's attitude toward information indirectly affects information utilisation through either the amount of information obtained or through other (undisclosed) variables. To date, little is known about the attitudes and research knowledge of healthcare managers as an occupational group.

In order to identify *attitude to research* the *need for cognition* scale (NCS) was included in the survey, as it was believed that this predisposition would lead to a more positive attitude to research (the issue of identification in nonrecursive models will be discussed in more detail below). I was also interested in determining the extent to which personality factors might directly, or indirectly, predict behaviour, particularly as they are generally ignored in the Theory of Planned Behaviour.

3.5 Additional predictor variables suggested by the literature

3.5.1 Need for cognition (A personality variable, limited to 'Need for Complexity' in the model, for reasons discussed later).

The Need for Cognition was first defined by Cohen, Scotland, and Wolfe (1955) as 'a need to structure relevant situations in meaningful, integrated ways. It is a need to understand and make reasonable the experiential world' (p. 291). More recently, Cacioppo and Petty (1982) developed a 34-item, and subsequently an 18-item, scale to measure NFC, which they describe as 'the (enduring) tendency for an individual to engage in and enjoy effortful analytic activity' (p. 116). The authors consider group members' predispositions toward mental laziness and suggest that there are 'Stable (though not invariant) individual differences in intrinsic motivation to engage in effortful cognitive endeavors generally, just as there are stable individual differences in intrinsic motivation to engage in effortful physical endeavors.' (1986, p.48). In other words, they are suggesting that individuals may be predisposed toward mental laziness or mental engagement. They call this construct 'need for cognition'.

Cacioppo, Petty, and Kao (1984) and Waters and Zakrajsek (1990) found the data from the 34- and 18-item NCS to be highly related and to have high internal consistency with Cronbach's alpha of .90 and .84, respectively. Sadowski and Gulgoz (1992) obtained a test-retest reliability of .88 with a 7-week period between administrations for the scores of an 18-item version of the scale. In 1996 Cacioppo *et al*, in a review of the NCS, presented numerous studies the results of which lend support to both the convergent and predictive validity of scores from the measure. Findings suggest that the scale is relatively gender neutral (Sadowski, 1993)

Two studies indicate that there may be three sub-factors to the need for cognition construct. In their study of the NCS, Tanaka *et al* (1988) modified the response format from the Likert type into a dichotomous forced-choice true or false format and then subjected the 34-item version to a factor analysis using the generalised least squares method. They identified the three factors as Cognitive Persistence, Cognitive Complexity, and Cognitive Confidence, and suggested that the subscales were highly related to a higher order Need for Cognition construct. Waters and Zakrejsek (1990) later used the Likert-type format, and their findings were consistent with those reported by Tanaka *et al.* I could find no evidence, however, that the scale had been subjected to confirmatory factor analysis; the above findings were based on exploratory factor analysis.

Sadowski and Cogburn (1997) investigated the relationship between *need for cognition* and the domains of the big-five factor model of personality. They found significant positive relationships between *need for cognition* and the big-five domains of 'openness to experience' and 'conscientiousness.' Tidwell *et al* (2000) conclude that *need for cognition* is a factor that contributes to the acquisition of knowledge, albeit that this is a modest contribution. They suggest that individuals high in *need for cognition* actively seek information to prepare themselves to deal with events in their world.

Following Petty and Cacioppo (1986), Scudder and Herschel (1994) found a link between need for cognition and the generation of information in the assessment of alternatives considered as part of the decision making process. The authors also found that decision quality was improved, primarily as a result of the generation of more alternatives, (when compared with the group made up of people with low scores on the NCS)

Nair and Ramnarayan (2000) investigated the relationship between the need for cognition of individuals, and their effectiveness in solving complex problems. They found that individuals with a high NCS score were more successful in solving the problem, collected information and made decisions on more aspects of the problem, and faced fewer crises during the process. They suggest that, 'the success of this process of problem solving is rooted in gathering adequate and relevant information on various problem dimensions so that the individual gains a grasp of the complexity, uncertainty and dynamic nature of the problem.' (p. 321) They also found, however, that at the higher end of *the need for cognition*, individuals were going into too many aspects of the problems, and the number of crises experienced increased.

Levin *et al* (2000) looked at differences in individuals' information processing style. They found that participants who scored highest on the NCS processed information in a more focused manner with greater depth and breadth than did participants with low scores. They found that the quality of their selections tended to be higher and they were more successful at adaptive decision making. Similarly, Bailey (1997) found that those people high in need for cognition were more thorough when judging or choosing alternatives.

Epstein *et al* (1996) found that heuristic processing (as opposed to analytical-rational processing) was determined primarily by the individual's 'faith in intuition', although *need for cognition* also contributed to heuristic responding. As systematic processing of messages requires greater effort than heuristic processing, it would seem reasonable to hypothesise that systematic processing occurs when the individual has a higher motivation to expend the effort involved;

i.e. a higher *need for cognition* which acts as an intrinsic motivator. Heuristic processing will dominate when an individual has low motivation for undertaking the effort required of systematic processing. Even in young children, (aged 10-13), Kovis *et al* (2002) found that there was a tendency for children scoring higher in *need for cognition* to favour analytic responses over heuristic. Reid *et al* (1995) found that individuals low in *need for cognition* recalled less of the information contained in a diabetes pamphlet.

Bailey (1997) argued that *need for cognition* has a meaningful relationship to decision strategy. His research suggests that people with a high *need for cognition* engage in more thorough decision making behaviour. Yet he notes that this emphasis on individual motivation and its link to decision making has been conspicuously absent, even though information processing is contingent upon both the motivation and the ability of the individual to process the message. He concludes that, because of differences in information acquisition, those who have a high *need for cognition* may possess a richer, more integrated information domain upon which to base decisions. This was supported by research undertaken by Bas (2003) who found that people who obtained lower scores on the NCS expended less cognitive effort in an external information search than those scoring higher, and exhibited more heuristic strategies particularly as time pressures increased. Cockerill *et al* (1993), assessed managers on two cognitive factors; cognitive complexity and information seeking behaviour, both of which they found to be positively correlated with business performance. They believed that these behaviours enabled individuals to perform at outstanding levels in fast changing environments. Of course this research was making the assumption, based upon the significant correlations the authors found, that these behaviours, if developed, would improve performance. This suggestion is making rather a leap from the correlational data they obtained, by proposing that the relationship between the variables is causal.

Cacioppo *et al* (1996) suggest that personality traits (such as *need for cognition*) are more stable than attitudes towards a given behaviour. I hypothesised that *need for cognition* would be a predictor of *attitude to research*, that individuals who scored higher on the NCS were more likely to be motivated to seek out and incorporate research information into their decision making, particularly in the absence of external pressures to adopt an evidence-based approach to decision making. The belief is that people low in *need for cognition* would not be motivated to adopt the systematic processing of research information, and would instead prefer to rely on heuristic processing. Thompson *et al* (1993) found that whilst *need for cognition* involves intrinsic motivation for effortful cognitive processing, it predicts such processing mainly in contexts with minimal extrinsic incentives for processing.

Hypothesis

***Need for cognition (complexity)* will be a weaker predictor of *attitude to research* in the clinical groups, and will be a stronger predictor where respondents are in higher grades.**

In the clinical groups exposure to the behaviour is more prevalent and therefore respondents' *attitude to research* will be formed more directly by that exposure rather than by personality characteristics. The latter will be more important where the individual is forming an attitude based on limited, or no, exposure to the phenomenon in question. Respondents in higher grades have more authority to translate their positive beliefs about a given phenomenon into action.

3.5.2 Experience

I could find no research which considered length of service and its relationship to research utilisation. One might expect that that one's length of service would be negatively correlated with attitude to research, particularly where the respondent works in a climate where evidence-based practice is a relatively recent phenomenon, as there may be a greater reluctance to embrace change and a higher reliance on past experience.

Hypothesis

Respondents' *length of service* will be negatively correlated with *attitude to research* in each of the sub-groups, and this will be significantly higher where the respondent works in a climate where evidence-based practice is a relatively recent phenomenon (i.e. the non-clinical management group).

3.5.3 Education

McCleary and Brown (2002) found in their study of research utilisation amongst pediatric nurses, that two variables were independently associated with a positive attitude towards research (i) an understanding of how to undertake a literature search and (ii) a higher level of education. Similarly, Rodgers (1994) undertook a survey of registered nurses working in general medical and surgical wards in Scotland, and found an association between higher educational level and research utilisation.

Diaz and Sligo (1997) undertook research to see if a relationship existed between education and information use. Their hypothesis was that as information is fed into a social system or organisation, the individuals or groups able to make best use of it are those with the greatest ability to interpret such information and see how it might be applied; i.e., those with the highest levels of education. They argued that, 'Information that is intended to improve the distribution of knowledge tends to be taken up and utilised by the literate much more successfully than by the less educationally able'. The study looked at educational level from those receiving no qualifications up to PhD level and found that the least educated people reported receiving most information on a range of topics, but report making least use of nearly all sources of information. The authors suggest that people with reduced education will, in general terms, make lesser use of information sources generally than do their better educated colleagues, regardless of the information requirements of their jobs. Weiss too (1977) found that her research confirmed that education levels of policy makers affected utilisation of research.

It seems likely that education level will predict *attitude to research* and research utilisation and evidence-based practice, via its impact on the development of *critical appraisal skills*. It is unlikely, however, to be a relevant factor where the education received is not associated with higher levels of the *critical appraisal skills* identified in the survey. My research will also explore the extent to which *education level* predicts seeking, research utilisation and evidence-based practice, once one has controlled for *critical appraisal skills*. The question is whether training in research skills improves utilisation of research evidence regardless of the individual's initial level of education.

Hypothesis

***Education level* will be a predictor of the behaviours modelled, only via its impact on *critical appraisal skills*, and will be a stronger predictor of these skills in the clinical groups.**

3.5.4 Managers' decision making and influencing style

According to Pollard (1987) how decision makers perceive or view the nature of decision making (e.g. analytical or political) can significantly affect the process of information utilisation. There are a number of ways in which one's line manager's decision-making style may affect respondent's attitudes towards research seeking and research use. Most people who have worked in large organisations will, at one time or another, have been managed by individuals whose idea of an effective influencing tactic is to use flattery and praise, to appeal to colleagues friendship and to appeal for favours. In this environment rational persuasion based on research evidence is less likely to prosper. An organisation where this 'personality driven' style of influence dominates, may also mean that information required for decision making is not made available to all concerned, in order to protect the interests of the favoured few. In this environment, individuals who don't 'rock the boat' by promoting logical arguments and factual evidence to support their decisions are less likely to be viewed as a threat by those who prefer this personality-driven approach. One is certainly unlikely to seek out information that contradicts established practice. It was, therefore, predicted that respondents' line managers' influencing style, particularly one based on threats and demand, would be a negative predictor of the behaviours examined. Other influencing styles, such as those based on rational persuasion, would encourage these behaviours.

Generally, researchers and practitioners in both the public and private sectors agree that participative management improves employees' job satisfaction and commitment, with the assumption that this will lead to improved performance. (e.g. Walton, 1985) In my previous role within a telecommunications company an attitude survey was distributed to all employees every year. One section of the survey asked respondents to report back on the leadership qualities of their line managers. Managers' bonuses were, in part, determined by these scores from their team members. The bonus payment was also dependent upon their teams' performance. A consistent finding (although one which was never acted upon) was that there was a negative relationship between a supportive/participative management style and team performance measures. Those managers whose style was based upon threats and demands generally achieved higher performance measures. It appeared as if contradictory demands were being placed upon these managers in terms of the objectives linked to their annual bonus payments.

Hypothesis

***A threatening and demanding management influencing style* will be a stronger direct predictor of the behaviours where respondents work in environments where these behaviours are** expected (i.e. in the clinical groups, as their managers will be focused upon extracting the behaviours expected in that environment).

and a further hypothesis related to this variable:-

***A threatening and demanding management influencing style* will also impact the behaviours negatively and indirectly, via *attitude to research*, in each of the sub-groups. It will be a stronger predictor where respondents work in environments where these behaviours are expected (i.e. in the clinical groups).**

3.5.5 Climate – Organisational Learning Climate (OLS)

There is a great deal of interest in promoting learning organisations and 'knowledge management', and general recognition that those organisations which will be the most successful are those which can encourage knowledge development and sharing. There is also widespread acknowledgement that increasingly an organisation's success will be dependent upon the knowledge and skills of its people. Over the last two decades, characterised by rapid change and restructuring, organisations have focused on the need to become learning organisations, and organisational culture is increasingly recognised as a major barrier to promoting the creation and sharing of knowledge.

The learning organisation is described as one which is populated by rational, competent individuals who are acting on the basis of valid information (Argyris, Putnam and Smith 1985). Quintas (2002 p. 1) claims that the best definition of knowledge management he has come across is from Xerox which says that knowledge management is about creating, 'a thriving work and learning environment that fosters the continuous creation, aggregation, use and re-use of organisational and personal knowledge.' He suggests that organisations need to foster a climate of constant learning; one in which people want to learn and upgrade their skills. Garvin (1993, p.80) defines a leaning organisation as, 'an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.' The important aspect of this definition is the requirement that change occur in the way work gets done; something happens as a result of the learning. Senge in *The Fifth Discipline* (1990) describes a learning organisation as 'a place where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free and where people are continually learning how to learn.' (p. 2)

The organisational culture is regarded as critical in explaining managers' willingness to embrace change, and to question established organisational beliefs and methods. Brooks and Bate's (1994) research suggests that the culture of the organisation can stifle management problem-solving capabilities by a shared inability to generate and embrace novel solutions. It is claimed that a positive learning climate is necessary for individual learning which, in turn, is necessary for organisational learning. Within the NHS there has been an emphasis on developing a 'culture of evidence-based decision making.' The national quality strategy for the new NHS highlights the present government's view that lifelong learning is essential in improving healthcare. Davies and Nutley (2000, p.998) note that, 'The government's quality strategy represents a bold blueprint for the new NHS. It embodies the view that managing the organisational culture in tandem with improved learning...will deliver substantial gains in performance.'

Coopey (1996) is critical of the lack of consideration given to the impact of organisational politics, specifically its ability to impede learning through the control of information. Salaman (1995, p. 33) notes that, 'the culture of most organisations is probably anti learning –because of the existence of rules and values and norms ...that encourage winning over analysis and understanding, and encourage protection and defensiveness.'

De Long and Fahey (2000) outline a number of ways in which the organisation's culture influences the behaviours central to knowledge creation, sharing and use:

- culture shapes assumptions about what knowledge is and what knowledge is worth managing.
- culture defines the relationships between individual and organisational knowledge, determining who is to control specific knowledge, as well as who must share it and who may hoard it.
- culture creates the context for social interaction that determines how knowledge will be used in particular situations.
- culture shapes the processes by which new knowledge is created, legitimised and distributed in organisations.

Ham *et al* (1995) and Closs and Cheater (1994) also emphasise the need to create a positive research climate. Leicester (1999) identifies 'seven enemies of evidence-based policy':

1. Bureaucratic logic. A reliance on the way things have always been done.
2. The bottom line. A focus upon measurement that says nothing about the quality of services.
3. Consensus. An over emphasis on getting buy-in from the key stakeholders.
4. Politics. What suits those in power, rather than what is rational.
5. Civil service culture. A distrust of information which comes from outside the system.
6. Culture of cynicism. 'This is the culture that allows us to go along with the company view or the conventional wisdom, even when we know it to be false, since our professional lives and career advancement depend on maintaining the lie.' (p. 6)
7. Lack of time. The demands of the job do not allow the manager the opportunity to collect and analyse the requisite evidence.

Whilst recognising the barriers to evidence-based practice, he goes on to note that 'The increase in processing capacity makes all sorts of things possible in the management of complex systems. There is now a capacity for instant information gathering and analysis which makes all policy into a continuous real-time experiment' (p. 6) Nilsson and Sunesson (1993) also concluded that the degree of institutionalisation and professionalisation of policy sectors explain the variations in research utilisation. A high degree of institutionalisation is characterised by institutionalised policies and procedures, agreements between decision makers, lack of competing policies, and a low level of conflict.

It is assumed in much of the debates concerning evidence-based practice, that the organisational climate is critical in ensuring both that the practise is supported and encouraged, and that positive outcomes result. LeMay *et al* (1998, p. 429) note that 'It is increasingly clear that the effective use and implementation of research depends in many factors ...including the existence of a receptive environment both in terms of the individual's attitudes and the organisational structures.' Specifically, the focus has been upon the extent to which an organisation (or team) can be described as being supportive of a 'learning' climate. Myrick and Young (2001, p. 461) claim that, 'The impact of the learning climate on students' ability to think critically...cannot be underestimated.' They suggest that this is due to the fact that students 'feel safe enough to question, to challenge and be challenged, and to be creative in their problem solving'. Nonika (1991) suggests that the role of management in a learning organisation is to provide a conceptual framework that help employees to make sense of information. In essence evidence-based practice provides this framework. Rowley (2000) notes that, in general, the literature concerned with the learning organisation contains little explicit reference to what is learnt; evidence-based practice is explicit about the criteria for assessing information and knowledge.

One dimension, which has not often been addressed in research concerned with organisational learning climates, is that of power. Empirical studies, suggest, for example, that decision makers are less likely to use counter-organisational information despite its scientific validity (Nelson *et al* 1987). Rich (2001) writes, 'the realities of bureaucratic and organisational politics continue to dominate over rational decision making.' Rich and Oh (2000) found that 'the use of information is a complex political activity within an organisation rather than individual rational behaviour'. They suggest that their study demonstrated that the organisational interest perspective has more relevance in understanding decision makers' behaviour in using information, than do other perspectives. Similarly, a study of mental health decision makers' reactions to research reports (Weiss and Bucuvalas; 1980) concluded that they apply both a truth test and a utility test. Truth is judged by research quality and conformity to prior knowledge. Utility is judged by feasibility and the degree of challenge to current policy. These two criteria and the relevance of the topic determine the assessment of usefulness.

Goh and Richards (1997) developed an Organisational Learning Survey (OLS) to measure learning capability. This was the instrument I utilised in my own research. It was developed in response to their view that there was no systematic, measurable approach available for practical application of this concept in organisations. The rationale is that certain management practices, and organisational conditions can help or hinder the process of organisational learning. They adopted the definition of a learning organisation from Garvin (1993, p. 86) 'A learning organization is an organization skilled at creating, acquiring and transferring knowledge, and at modifying its behaviour to reflect new knowledge.'

The authors argue that the instrument captures a set of consistent organisation conditions and management practises that are important for building learning organisations.

1. Clarity of Purpose and Mission

This includes the extent to which employees believe they understand the organisation's purpose and goals and how the work that they do contributes towards the achievement of the organisations mission. Senge (1990) noted how creating a shared vision of a future desired state creates tension that leads to learning. . Employees understand the gap between the vision and the current state and can better strive to overcome that gap (Mohrman and Mohrman Jr, 1995).

2. Leadership, Commitment and Empowerment

Most writers agree that leaders must foster a learning climate through their behaviours (see for example, Garvin, 1993 and Slocum *et al* 1994) The survey items test the extent to which respondents believe their leaders share a common vision with staff, involve staff in decision making, provide feedback and can themselves take feedback on their own performance.

3. Experimentation and Rewards

The authors suggest that this is by far the most consistent managerial practice that is observed in learning organisations. The survey assesses the extent to which people feel they have the freedom to experiment with new work methods and whether new work methods are encouraged and supported.

4. Transfer of Knowledge

The survey assesses the extent to which information is perceived to cross functional and sub-unit boundaries within the organisation. The learning organisation needs to be able to transfer knowledge across departmental boundaries and to transfer knowledge from the external environment.

5. Teamwork and Group Problem Solving.

Structures and systems in the organisation need to encourage teamwork and group problem solving and reduce the dependency on senior management. Teams need also to have the ability to work cross-functionally. By working in teams knowledge can be shared among organisational members; problem solving can be undertaken by informal teams from a variety of functional backgrounds.

The authors tested the survey in a number of different organisations and concluded that the OLS showed promise as a basis of a systemic approach for measuring the learning capability of organisations. They also found that there was a significant positive correlation between the OLS and job satisfaction (r=0.64). They compared the OLS to a scale that measured the degree of formalisation in the workplace and found a significant negative correlation (r=0.23); the latter suggesting that a highly formalised organisation (for example, with many rules and regulations) would constrain some of the characteristics of a learning organisation. They state the reliability of the instrument as 0.90 (Cronbach's alpha). I obtained the same figure, but confirmatory factor analysis suggests that the survey does not perform as the authors suggest. This will be discussed in greater detail in chapter 4.

I was particularly interested in understanding the impact (either direct or indirect) of the organisational culture, (specifically, the extent to which an organisation is perceived to have a *supportive learning climate*), upon the introduction, use and impact of an evidence-based approach. I also wanted to determine if it was possible for a supportive learning climate to reduce the amount of political decision making within the organisation. One might expect that if clear criteria for decision making were established through the grading of 'evidence', then the opportunity for political decision making might be diminished.

Oh and Rich (1996) suggest that most organisational factors facilitate use of information indirectly rather than directly. This is an important finding because past studies that discuss organisational aspects of information utilisation (Corwin and Louis, 1982; Shrivastave, 1985) do not consider such indirect relationships among variables in the process of information utilisation. The Theory of Planned Behaviour does not explicitly take into account the impact of the climate in which the behaviour of interest takes place. The suggestion is that the impact of climate is via PBC, attitude development or social norm variables. As the impact of climate is considered critical in promoting research seeking and utilisation, I was interested in modelling this construct explicitly to determine the strength of its relationship with these behaviours, and to determine whether or not its impact was direct or via the three factors explicitly modeled in the TPB.

Hypothesis

***Organisational learning climate* will impact upon the behaviours indirectly via its effect on *perceived behavioural control*. It will be a stronger predictor of *extrinsic and intrinsic PBC* in the clinical groups.**

(As the climate is oriented towards the encouragement of these behaviours and providing the requisite resources).

3.5.6 Grade

Grade was hypothesised to predict research utilisation due to its impact upon perceived control, specifically authority; the extent to which people believe they have the authority to use research evidence in their work if they felt it was worth their while, and the authority to access the requisite information. West *et al* (2004, p. 6) found that, 'implementation of innovations require the role a person occupies to be invested with choice and power; for example, individuals must have some autonomy and discretion in their job and, perhaps more important, the ability to influence decision making.' I have hypothesised that grade is likely to become less important in predicting utilisation (and perceptions of authority) in environments which encourage research-based decision making. One would expect that the quality of the information would be the key factor in influencing the acceptance of a proposal, rather than the grade of the proposer. Similarly, need for information would be the basis for supply (or the opportunity to obtain the information), rather than the grade of the employee. Evidence-based decision making is centred on the justification of decisions, and provides criteria against which this justification can be assessed. The quality of the information is key, rather than the role or grade of the decision-maker. Evidence-based practice provides a common and explicit framework for decision making which, hypothetically, should enable and encourage more people to engage in the decision making process. Grade, may, however, still pay an important role in translating research evidence into tangible improvements as people in higher grades will have greater authority to translate research findings into practice. This will be discussed in greater detail when I consider the variable *perceived improvements.*

3.6 The Outcome Variables

The utilization of research Information in decision making

Some scholars have noted that management procedures may persist over extended periods because of their widespread acceptance and taken for granted nature (Meyer and Rowan 1977; Zucker, 1977). Others, however, have used institutional theory to explain why organisations appear to jump from one fashionable practice to the next (DiMaggio and Powell, 1983; Abrahamson, 1991). Straw and Epstein (2000) found that companies who continually adopted popular management techniques did not have higher economic performance. Nevertheless, they found that they were, 'more admired, perceived to be more innovative, and rated higher in management quality.' Higher pay was also given to their chief executives. This suggests that there are rewards for those managers who are happy to jump on the latest management bandwagon. The authors ask whether it would ever be possible for researchers to act as a 'buffer' to fashion trends by conducting and disseminating findings on the effectiveness of management techniques. What factors are important in prohibiting or encouraging this?

In 1971 the American National Science Foundation (NSF) created a new Division, the purpose of which was to test procedures and mechanisms for transferring policy-relevant knowledge to public officials responsible for decision making. The Division was named Research Applied to National Needs (RANN). They were mindful of the problems inherent in bridging the research-practise gap, as posited by the 'two culture' theorists. (e.g. Broadfoot, 1988). The argument is that communication barriers between researchers and practitioners, their different concerns and working environments, inhibit the flow of relevant and valid knowledge from knowledge producers to knowledge users, and that the latter are frequently unable to translate their information needs into testable hypotheses. RANN's role was to close the gap between the two cultures in which researchers and practitioners were believed to operate.

Undertaking research into RANN's effectiveness, Rich (2002) found that addressing the issues highlighted by the two cultures theory was a necessary but insufficient step in promoting the use of social science information by policy makers. He argues that information utilisation is best understood within the political and bureaucratic processes. He writes, 'Issues of control and adherence to established organisational procedures have to be resolved before such an experiment could have a chance to be successful.... Organisational interests are dominant in influencing decisions to collect information and decisions to use it.' (p. 152).

There is some evidence that intuitive judgments are liable to be less effective than those based on research evidence. Griffin and Tversky, (1992) and Nisbett and Ross (1980), suggest that intuitive judgments lead to overconfidence in decision making. Dean and Sharfman (1996) found that managers who used analytical techniques made more effective decisions than those who did not (although they did also find that this was more likely in stable environments). Dale and Cooper (1992, p. 100) state that in order to make effective decisions 'individuals need to base their decisions on facts and data, not on opinion and sixth sense'. Bennett and Gabriel (1999) found that tacit knowledge and intuition were either non-existent or misguided unless there was a strong basis of hard information on which interpretations could be based.

There is an ongoing debate concerning the extent to which managerial decision making can be based upon scientific evidence. There are a number of reasons for such doubt: lack of relevant research findings, lack of managerial skill in interpreting research, the required speed of managerial decision making, the complexity of the decision making, etc. Taking a rather different perspective, Rule (1971) pointed out that problems were there in the first place, not because of an absence of knowledge, but because of conflicting interests. Johnson (1999) commented that, 'The dreams of rational man did not take politics into account. The dream was that reason would liberate society from its many ills and frustrations....'. (p. 23) There is also the suggestion that decision making in the policy arena has less to do with the formal techniques of rational problem-solving, and more to do with argument, rhetoric and the selective use of information to support one's argument. One of the aims of my own research is to determine whether or not an evidence-based approach to decision making is felt to have generated improvements across a number of work areas as well as for those in different roles.

3.7 Research seeking

Understanding the conditions that motivate or deter information seeking has become a critical concern for organisational researchers, particularly as the amount of information available appears, at times, to be overwhelming (e.g. Iselin, 1989; Johnson, 1996). The underlying assumption here is that there is a positive correlation between management success and effective information needs identification, gathering and use. A great many variables impact on an individual's need for information, cognitive differences between people as well as situational factors (e.g. the need to make a decision, availability of information, etc): yet despite acknowledgement that both individual and situational influences determine behaviour, there has been a great divide between these two lines of research. Cronbach (1957) makes the distinction between 'experimental' and 'correlational' approaches. The focus of the former is on the environmental causes and constraints upon behaviour, whereas the latter is more concerned with individual differences, such as personality and intelligence. He suggests that the two approaches ought to be synthesised. Hattrup and Jackson (1996) also argue that neither a purely correlational nor a purely experimental approach can comprehensively capture the nature of human behaviour in complex systems. This research will consider a 'person-in-situation' model. Information seeking is constrained by individual knowledge levels, abilities and personal styles, and at the same time by situational variables. There is a further dimension to this, which is the interaction between individual and situational variables. An individual with greater influencing skills can acquire more scope to act in an organisation that encourages learning. Such an organisational climate might also lead a person with a low need for cognition, to seek out information. The interactionist approach I have adopted has emerged in an attempt to reconcile the two theories. The relationship between research seeking and information seeking more generally is often unclear. In this research I have been specific about the sources and type of information which could be regarded as research, rather than simply information gathering. 'Numerous theorists agree that exploration, or information seeking, has earned the status of a basic drive and that the smooth functioning of exploration enhances successful mastery of the environment.' (Wentworth and Witryol, 1990, p. 301). One possibility is that the process of reducing uncertainty has reward value in and of itself (Deci, 1975). In this instance we might expect that a higher *need for cognition* would be positively related to information seeking. Alternatively it could be that uncertainty constitutes an unpleasant state, and information is valued because it reduces uncertainty. The achievement of long term goals may also be a motivator, 'Both considering oneself to have a strategic approach to furthering one's career, and being open to changing employers...are associated with higher scores on the knowledge acquisition scale' (Patch *et al*, 2000 p. 5). In order to explore this further, I have asked about the ambition of respondents for career advancement.

There is some evidence to suggest that research seeking is not widespread in the management population. Jordan (1999), for example, surveyed practitioners and academics working in the area of leisure services. She found that between 61% and 86% of all respondents rarely or never read research journals. These numbers were greatest amongst practitioners with 65% to 96% reporting that they never read major research journals.

3.8 Research utilisation and evidence-based practice

The field of research utilisation gained prominence in the 1950s, primarily due to two seminal figures: Kurt Lewin (1951) and Paul Lazarsfeld (1977). Both were positivists, and believed that there was a body of scientific knowledge that could help to alleviate social problems. Landry *et al* (2001, p. 396) define research utilisation as 'a field of knowledge concerned with factors explaining the utilisation of scientific and technical knowledge by decision makers and those in professional practises.' Caplan *et al* (1975) focused on the respondents' use of empirically based social science research in policy-related decision making. Utilisation was said to occur when the respondent was familiar with relevant research and gave serious consideration to and attempted to apply that knowledge to some policy-relevant issue.

Throughout the last two decades the importance of research in guiding healthcare practice has been repeatedly stressed (Department of Health, 1993a, 1993b UKCC, 1993). It has recently gained even more urgency with government initiatives seeking greater effectiveness and efficiency in healthcare. The basic premise of these initiatives is that using social science information for policy making is a 'good thing'. Use is good, more use is better. The focus on evidence-based decision making in clinical practice has led to a call for managerial practice to be similarly guided by research evidence. Healthcare managers are being urged to base their decisions on research evidence where it is available, as well as to undertake more research in their own work. Ovretveit (1998, p. 394) speaks of 'evaluation-informed' health management. He writes that, 'health policy makers and managers can no longer afford not to make a greater use of evaluation in making and implementing decisions.' Kovner *et al* (2000) claim that managers generally lack adequate support to evaluate interventions and be guided by 'best practise'. They suggest that 'The creation of evidence-based management cooperatives might be a means to change this trend' (p. 3). Yet it is still unclear whether or not research has the potential to illuminate and guide management practice. Furthermore, as May *et al* (1997) point out, clinical practitioners and managers may hold differing perspectives regarding the nature of research, its role, and the opportunities and restrictions which affect its dissemination and use.

Rossi and Freeman (1993) observed that research results can be used in three ways by an organisation:

- Instrumental or direct use; documented, specific use of the research by the organisation.
- Conceptual use: research that leads to a change in thinking. Individuals within an organisation become sensitised to an issue.
- Persuasive (or political) use; here research is used to justify the existing and or current policy of an organisation.

Weiss (1977) suggests that conceptual and instrumental use do not lie at opposing ends of a continuum, rather instrumental utilisation is a subset of conceptual utilisation, whereas conceptual utilisation is itself equivalent to the process of learning and knowing. I have included variables that attempt to measure each of these sub-factors. As with information seeking, the use of research information is a complex phenomenon, one must take into account individual and organisational variables, as well as specific characteristics of the information itself. Mutschler (1984) suggested that four factors influence research utilisation: (1) perceived relevance (2) utility for immediate action of decision makers (3) involvement of practitioners and (4) organisational context. Generally, however, researchers have focused upon one set of variables whilst ignoring other factors. Rich (1997) points out that we do not have a comprehensive conceptual framework, one which (a) identifies and distinguishes the variables involved, and (b) examines how these various factors are linked. For example, as Huberman (1987) points out, we may agree on a set of explanatory variables, but disagree that they are equally important across policy areas in accounting for information use and its impact. The organisational interest perspective, for example, assumes that organisational norms, rules and procedures are essential for understanding information acquisition, dissemination and utilisation. It also assumes that choices with respect to acquiring and using information are predictable and that actors make choices to maximise organisational interests. Whilst this is one perspective amongst many, it focuses one upon the conditions or factors that influence research seeking and utilisation.

There is a rapidly expanding literature on the utilisation of research where the focus has been on the organisational characteristics that inhibit or encourage utilisation. Royle *et al* (2000), for example, suggest that the organisation is the most important factor for promoting research utilisation amongst nurses. Other researchers, e.g. Morrison and Vancouver (2000) have argued that research into information seeking is more consistent with a within-person approach. She suggests that, although research on information seeking has not always been explicit in delineating its underlying theoretical framework, 'the emphasis on costs and benefits has clear parallels to more general theories of behavioural choice, such as expectancy theory and other expectancy-valance models' (p. 120); theories which were designed to explain within-person choice.

Oh and Rich (1996, p. 182) were the first to test an integrated model of information utilisation. They define 'information' as 'findings of social science research about the way a policy actually works or would work if it were to be adopted.' The model contains four sets of primary variables: decision makers' environments, organisation factors, individual characteristics, and characteristics of information. A path model was tested which demonstrated that information utilisation is affected directly and indirectly by a variety of factors and their linkage, and not dominated by one set of factors that is defined by a single perspective. Again, however, the model did not consider the impact of past behaviour, also (due to the methodological approach adopted) only one item per variable could be included in the model. This is less important when considering variables such as age or education level, but can give misleading results when more complex constructs, such as attitude or aspirations, are included in the model.

Respondents were asked specifically about the extent of evidence-based practice at an individual, team and organisational level. This variable was included in addition to research utilisation, being a more specific definition of this term, and having a precise meaning in practice.

3.9 The Moderating variables

3.9.1 Clinical/non-clinical managers and clinical practitioners

Smith (2001) questions what sort of data provide appropriate evidence for particular types of decisions. There is the danger that all recommendations are 'medical' because those are the type that have the evidence behind them. Yet these assessments are largely restricted to individualised interventions. Smith notes that societal problems require solutions at a different level. He gives the example of health differentials between social groups, or between rich and poor countries, which are not primarily generated by medical causes. Rein and Winship (1999) stress a number of difficulties in adopting such an evidence-based approach in thinking about social issues. They recognise that whilst science can appear attractive, in terms of representing a set of agreed upon procedures for answering questions and reaching consensus, its use in resolving policy decisions is severely limited. He notes the following limitations:

- Social science has been able to provide only 'weak' causal theories, only a small amount of the variation in the dependent variable is explained as there are many intervening variables.
- There are essentially normative questions that it cannot answer; i.e. what is the 'right' thing to do?
- The results can be quite sensitive to how the models are specified. It is hard to get agreement on the final result, as it is always possible to challenge the conclusions in terms of how the model was specified.

Despite these concerns, they concur that, 'although social-scientific knowledge is imperfect, it is the best basis we have for developing policy. Despite its weaknesses, social science should be the principal tool for the development of sound policy.' (p. 42).

Similarly, concerns have been raised regarding the applicability of evidence-based decision making by healthcare practitioners, to more general management decision making. Within the NHS, there is also the assumption that managers and clinical practitioners hold differing perceptions about the nature of research and its utilisation (Le May *et al*, 1998) although this appears to be anecdotal. Managers must frequently make many decisions within the course of the day, within very short timescales. Rational yet efficient decision making is a complex balancing act, what Langley (1995) describes as being between 'paralysis by analysis' and 'extinction by instinct'. Walshe and Rundell (2001) suggest that the culture, research base and decision making process of clinical practice and of health care management are different in many ways. They highlight the key differences between managers and clinicians that may militate against the use of evidence-based practice for the former.

1. The clinical culture is highly professionalised, with a formal body of knowledge that acts as a frame of reference for dialogue and debate. In contrast healthcare managers are a diverse group, from different backgrounds with no shared language. (One could, of course, argue that EBA would provide managers with this shared frame of reference).

2. Clinicians often have a twin career track in research and clinical practice, whereas managers lack an adequate understanding of the research process. Partly, this is a skills issue, but, as Wong (1998, p. 141) points out, it has led to a 'division of labor.... between those who are directly involved in policy intervention and those who conceptualise the nature of social problems.'

3. Clinicians and managers come from very different research traditions, 'biomedical versus the social sciences', making clinicians more positivist in their outlook. Here the suggestion is that clinicians will be more positively disposed to research findings.

4. The evidence base for clinicians is relatively well defined and organised, whereas this is not the case for healthcare managers. The knowledge utilised by people managers comes from a wide variety of disciplines: business studies, psychology, sociology, economics, to name only a few.

5 There is often the presumption of high generalisability on clinical research. In contrast, the importance of local context and culture make research transfer for managers more problematic. This raises the question of how useful an evidence base would be for managers. Gullifer (1997) suggests that research which aims to develop knowledge that is generalisable needs to be based on coherent and relevant theoretical and/or philosophical foundations.

6. Managers make fewer, but larger decisions, with longer timeframes, and many intervening variables –with many more sources of confounding or bias in connecting the decision and its effects. This alerts us to the need to examine the extent to which an evidence base could be made available to managers.

7. Clinicians have far more freedom in their decision making, for managers it is more of a group activity. In addition, the perceived success of the intervention will be dependent not only upon the quality of the decision, but how well that decision is implemented – generally by others within the organisation.
8. Management decision making is generally more constrained, contested and political. The issue here is whether scientific evidence could reduce the amount of political decision making.

One further concern I would add to the above, is the extent to which senior managers are open about their objectives. There may also be conflicts between short-term and long-term outcome achievement. If the objectives are unclear, then it is difficult to measure the 'success' of an intervention. Fabian (2000) points out that one frequently finds a lack of goal consensus within organisations. Dean and Sharfman's (1996, p. 373) research suggests that 'the orientation towards organisational goals as opposed to political makes it likely that procedurally rational decision processes will be effective.' They designed scales to measure both procedural rationality and political behaviour, and found that rational decision making was related to the successful achievement of outcomes, unless there was a political agenda, when this failed to hold true. There is likely to be a lack of co-ordination and opportunity for knowledge input when objectives are political. Effective evidence-based practice relies upon the objectives being made clear.

Walshe and Rundell (2001, p. 451) conclude, however, that there is certainly scope for making better use of research evidence, 'when deciding how to organize, structure, deliver or finance health services.' They suggest that it is necessary to foster a climate of 'learning through research' (p. 449) and to change managers' attitudes towards research evidence and the research process. 'We need to make managers more aware of research, more interested in undertaking or participating in research, and better equipped to understand and act on the results of research.' (p. 452). They believe that such a change would lead to managers being better equipped to deal with the complexities of clinical practice, and to support the wider development of evidence-based healthcare.

Certainly there is much evidence to suggest that the utilisation process is affected by the policy area in which the information is being applied (Bardach, 1984: Rich and Oh, 2000) The policy area in which one makes management decisions might reasonably be expected to affect one's attitude to research, and the extent to which one seeks out and utilises research evidence. Respondents were asked to identify whether they were clinical practitioners, clinical managers or whether their role did not encompass clinical decision making. We would expect to find that there is greater utilisation of research evidence by practitioners than by the managers of practitioners, and that managers without any clinical management responsibilities would utilise least research evidence in their work. In addition to examining the extent of research utilisation by role, I also explore whether the hypothesised model, which examines the process and predictors of utilisation, also differs depending upon these differing roles.

3.9.2 Continuing Professional Development (CPD)

There is a widespread belief that in order to be equipped to meet the continued challenge of change within the NHS, both clinicians and healthcare managers must acquire, maintain and enhance their knowledge skills and attitudes if they are to maintain and improve both individual and organisational performance. One would expect to find that individuals who undertake relatively more professional development, would be more likely to adopt a research-based approach to decision making, but that this would be moderated by factors such as the environment in which they work and the skills levels necessary to adopt such an approach.

Presently, the Institute of Healthcare Managers defines three levels of management: operational, tactical and strategic. There are six core dimensions which then go on to specify the competencies and behaviours expected at each level of management. These core dimensions are as follows:

Communication and working with others

Managing risk

Optimising resources

Leading change

Developing oneself and others

Working with people

Managers must then complete a pro forma (based on Kolb's experiential learning cycle), which encourages them to identify and reflect on the learning that they have achieved by undertaking CPD activity. This is in addition to the CPD requirements of any other professional bodies they may be members of, and to an organisational appraisal system which may identify different competencies again.

Respondents were asked to identify the amount of days they spend engaged in professional development activities in the average year. The same categories were used as in the 1997 Thomson *et al* study of CPD activities in MBA students. I was interested to explore the differences in the hypothesised model between those people who were more intrinsically motivated to develop and maintain professional competence, and those who were less strongly motivated, and whether or not engagement in CPD encouraged research-based decision making.

3.9.3 CASP Training

The Critical Appraisal Skills Programme (CASP) was developed by the Institute of Health Sciences, based in Oxford, UK. The programme was developed with the aim of improving the critical reasoning skills of National Health Service decision makers. The team took the principles of evidence-based medicine and used them to develop a programme that they describe as being geared to the specific needs of decision makers in the NHS. They describe their aim as being to help decision makers and those who seek to influence decision makers develop skills in the critical appraisal of evidence about effectiveness, in order to promote the delivery of evidence-based healthcare. It developed in response to a growing demand at local and national level for the need to base healthcare decisions on sound evidence of clinical effectiveness. The original funding came from the Purchaser Development Unit at the (then) NHS Management Executive, and was developed in partnership with the purchasing authorities in the four counties of the Oxford Region. The programme has since been broadened in its scope to be relevant to all decision makers in the NHS and has been running since 1993 for both medical and non-medical healthcare professionals and consumers. CASP has played an important role in the proliferation of evidence-based decision making within the NHS. The stated aims of CASP include:

- to help people find and appraise evidence about the cost-effectiveness of interventions.
- to help people make sense of evidence about effectiveness.
- (to be able to) assess the effectiveness and efficiency of medical interventions so that resources can be used to maximise the health gains of the population.
- to work together to get research evidence of effectiveness into practice.

The programme covers three steps that are believed to be necessary in order to use evidence in one's work:

- searching the literature for relevant research.
- appraising the evidence.
- acting upon the evidence.

CASP workshops focus on the critical appraisal of systematic reviews of effectiveness. The importance of critical appraisal skills is discussed, and a presentation is given explaining the types of trials, reviews and meta-analysis together with some basic definitions of epidemiological and statistical terms.

Following this introduction, participants undertake small group work where they critically appraise a review article using a checklist. The groups then feed back their findings in a plenary session at the end of the workshop. CASP later developed workshops looking at other kinds of evidence including the critical appraisal of individual trials, economic evaluations, cohort studies and qualitative research. In 1999 CASP launched its open learning materials that allowed people to learn at their own pace and at a time and place convenient to them: it also meant that the materials were able to reach a far wider audience.

Sackett and Parkes (1998, p. 203) point out that the job of evaluating the success of programs that teach critical appraisal has been 'terribly difficult', 'it is unusual for evaluators to be permitted to assign learners randomly to different programmes even in the short term...(and) it is difficult or impossible to isolate the contribution of instruction in critical appraisal ...' They conclude that staff turnover makes the problem even more difficult.

Respondents were asked in the questionnaire whether they had attended a CASP programme. We would expect those who had undergone the programme to feel more confident of their skills in this area, and that this would result in greater research seeking and utilisation (Sormunen and Chalupa, 1994). The assumption is that the development of critical appraisal skills will lead to greater use of research-based decision making, and greater involvement in the strategic decision making process, assuming that the appropriate research evidence is available, and the organisational climate is supportive.

3.9.4 Grade

As well as identifying grade as a predictor variable, the literature suggests that this variable may moderate the relationship between perceived behavioural control and the behaviours of interest (Bunce and Birdi, 1988). The suggestion is the variables related to PBC may be more important for those in lower-graded posts.

3.10 Outcomes of research utilisation and evidence-based practice

3.10.1 Perceived improvements

The concept of research utilisation has proved difficult to operationalise, at least in the context of decision making in the policy arena. There is very little consensus on what is meant by "use", and it is even more difficult to identify the impact that such use has on individual and organisational learning.

Firstly, research evidence is unlikely to have an immediate or direct impact on decisions; its influence is generally indirect and incremental. Research knowledge tends to seep into decision making, rather than being directly applied to a specific problem at hand. Any changes are likely to be are fairly subtle and diffuse, and perhaps only observable over a relatively long timescale. It may be that because of these factors the impact of an evidence-based approach to decision making has been underestimated. Indeed the disappointing lack of evidence for the use of research in problem solving led Weiss and Bucuvalas (1980) to argue for an expanded definition of utilisation. Weiss and Bucuvalas distinguished between various outcomes of utilisation: raising an issue, formulating new policies or programmes, and evaluating alternatives; and an attempt was made to incorporate these into the outcomes respondents were questioned about in my IHM survey. I aimed in my own research to gain a better understanding of respondents' perceptions concerning the improvements that they felt had been brought about as a result of their adoption of an evidence-based approach. These outcomes are obviously more general than those that are applicable to evidence-based medicine, where one can attempt to directly measure improved patient well-being.

Hypothesis

The clinical management group and those in higher grades, will be significantly more likely to generate *improvements* from the adoption of an evidence-based approach. (As the organisational climate is more supportive and outcomes easier to identify in the clinical group, and there will be fewer obstacles in the way of translating one's learning into action if you are in a higher grade).

3.10.2 Decision type

One expected outcome from the adoption of a research-based approach to decision making is that employees may experience greater levels of participation in the strategic planning process. (Briner, 1998). He suggests that employees' views and attitudes towards new initiatives would need to be taken into account in organisations where this approach had been adopted. The untested assumption is that a common framework for evaluating interventions, and the development of the critical appraisal skills necessary to undertake this evaluation, would enable more employees to play a role in the decision making process at a more strategic level.

The extent to which one is able to take strategic decision making process could, however, also be a predictor of research utilisation. It could be argued that if one's role does not allow the flexibility to engage in the decision making process at this level, one is less likely to engage in research seeking or research utilisation. The ability to employ a nonrecursive methodology demonstrated that, whilst this variable failed to predict any of the variance in the behaviours of interest, it was an outcome of respondents' engagement in these behaviours.

Hypotheses

The importance of *grade* and *education* in predicting *decision-type* will be less important in the clinical groups, and where people undertake higher levels of CPD.

3.11 Political utilisation of research evidence

I also wanted to explore those variables that encouraged or reduced the amount of political utilisation of research evidence.

Research based decision making, while seemingly a rational process, is also a political process. Muir Gray (1997) claims that policy making is a political process, based not only on evidence but also on the value politicians place upon different types of decision making. He gives the example of centralised as opposed to decentralised decision making. Here the way in which the decision is made is of importance, and not just the actual decision. He is really speaking of 'politics' as driven by values or preferences, rather than that of acting out of self-interest; and from his perspective, the merging of 'political' and evidence-based decision making is relatively unproblematic. 'Resource constraints and political pressures do not negate the need for evidence; on the contrary, the need for research-based knowledge is heightened...' he claims (p. 33).

Allison (1971) drew a distinction between three basic organisational decision making models:

- The rational model. A rational, value maximising choice among alternative courses of action in view of a set of logical and agreed upon courses of action.
- The organisational process mode. Here, the choice of action is normally confined to pre-established routines. Open search for new options rarely occurs.
- The political model. Decision making and actions are determined through the process of conflict, power struggles and consensus building. Individual and group self-serving interests constitute the building blocks of the political process.

From this perspective, it could be argued that the rational approach to decision making advocated by an evidence-based approach, could conceivably help reduce political decision making, and prevent organisations being confined in their decision making by pre-established processes and routines. It is possible to regard *evidence-based* decision making as a method of countering *political* decision making that reinforces the powers of those at the top of an organisation, and a method of decision making that reduces the power of the bureaucrats who make decisions based on past experiences and established policies. Although a political climate generates both winners and losers, it is generally believed that decision making becomes less effective as an objective basis for the decisions made is compromised.

One must consider an alternative argument however; that employees seek to satisfy not only organisational interests, but also their own wants and needs, driven by self-interest. From this perspective it is possible to regard research-based decision making as a framework through which those who currently hold power might lend further legitimacy to their decisions, primarily through the appearance of objectivity and openness. Rich (2001) found that there were a number of instances when information had been withheld or suppressed by managers within the organisation. Although he could find no evidence that research information had been deliberately misused to serve purely political ends, it is certainly not inconceivable that this takes place.

I was interested in identifying the extent of political utilisation of research evidence and the impact such behaviour has, as well as identifying those variables that predicted the political use of research evidence. Whilst political utilisation is frequently mentioned in the research literature, there has been no attempt to determine the individual, task and organisational characteristics, which might promote this type of use. If the political use of research evidence is widespread then this is likely to have an impact upon its usefulness in an organisational context. I have asked about the individual's own political use of research evidence, as well as that of their team and in the organisation more widely. It is important to distinguish political activity at different levels in the organisation. Employees experience separate political environments at work and do draw distinctions between them (Maslyn and Fedor, 1998).

I expected to find that political use of research evidence by one's team and/or organisation would have a negative impact on the individual's attitude to research. The relationship between perception of organisational politics, attitudes, and several other work outcomes was examined by Vigoda, (2000). Perception of organisational politics was found to have had a negative relationship with job attitudes, a positive relationship with intention to leave the organisation, and a stronger positive relationship with negligent behaviour. Schneider (1987) found that information processing within organisations can be negatively affected by organisational politics. The research suggests that public personnel will tend to react to workplace politics with negligent behaviour rather than by leaving. Kumar and Ghadially (1989) found a positive relationship between one's perception of political behaviours and alienation from the organisation. Parker *et al* (1995) found that perceptions of organisational politics were negatively related to perceived innovation, which would appear to support this proposition.

It is also worth noting that the association between a political organisational climate and negative job attitudes is stronger for employees of lower status that for those of higher status. Drory (1993) and Parker *et al* (1992), reported an inverted U-shaped relationship between hierarchical level and perceptions of organisational politics. We may find that political use of research evidence has a far weaker impact on the attitudes of individuals in higher grades. Thus the four remaining hypotheses were formulated:

Hypothesis

Political utilisation of research evidence within the team* will increase *political use of research evidence by the individual.

Hypothesis

Political utilisation of research evidence within the team* will have a negative impact on the individual's *attitude to research.

Hypothesis

A management *influencing style based on threats and demands* will increase *political utilisation of research evidence by the individual.*

Hypothesis

An *unsupportive learning climate* will increase *political utilisation of research evidence.*

<u>3.12 The case for exploring reciprocal relationships between the variables.</u>

The relationship between attitudes and behaviours has long been debated. Attitude and behaviour relationships were first thought to be consistent, then inconsistent and finally correlates (Shrigley, 1990). Shrigley's research was aimed at determining if attitude scores can reflect science behaviours in the classroom by examining different attitude-behaviour relationships. He considered five hypotheses: that attitude precedes behaviour, attitude is behaviour, attitude is not directly related to behaviour, attitude follows behaviour, and attitude and behaviour are reciprocal. His conclusion was that the two have a reciprocal relationship.

Ajzen himself (2002, p. 107) wrote that, 'Faced with uneven and generally modest success in attempts to account for human behaviour, it is tempting to look with envy at the reputed ability of prior behaviour to predict future action.' He asks whether one might wish to incorporate past behaviour as one of the major predictors in the TPB. He found that the relation between prior and later behaviour is not fully mediated by the constructs that serve as predictors in the TPB. In a study of exercise behaviour, for example, frequency of exercise reported on the second occasion in the research was regressed on the variables contained in the theory of planned behaviour and on exercise frequency reported in the first survey (prior behaviour). He found that the results of a hierarchical regression analysis revealed a significant residual effect of prior exercise on later exercise. He notes that without the consideration of past behaviour, the TPB accounted for 41% of the variance in exercise behaviour. However, adding past exercise behaviour to the prediction equation explained 54% of the variance. Ajzen suggests that this could be attributed to habitualisation i.e. rather than being cognitively controlled and guided by deliberate intentions, they require little cognitive effort, being more of an automatic response. His preferred explanation, however, is that this finding is instead related to inaccurate or unrealistic behavioural, normative, and control beliefs, weak or unstable attitudes and intentions and inadequate planning. In such circumstances, one's beliefs and attitudes are unstable and fail to provide clear guides to action; as a result their predictive validity will suffer. He claims that empirical evidence supports this proposition by showing that the residual effect of prior on later behaviour is eliminated where respondents have relatively accurate control beliefs and realistic intentions. In effect, he is suggesting that past behaviour has an impact on future behaviour via its impact upon the variables included in the TPB. He hypothesises that even habitual processes should be mediated by stable cognitions, and that it is unlikely that many of the complicated behaviours studies utilising the TPB, could ever be under non-cognitive habitual control.

Ajzen (1988) notes that attitudes are typically viewed as more malleable than personality traits, and that previous behaviour can impact upon them. One reason he gives for this relationship is the need to reduce cognitive dissonance, so that, if a person's actions conflict with their attitudes and values, they can be expected to reduce the resulting dissonance either by modifying their behaviours or by changing their attitudes. The theory is that people are motivated to maintain consistency among their beliefs, feelings and actions. In this particular instance, the theory of cognitive dissonance would suggest that people might develop a positive attitude to research utilisation as a result of being required to adopt this practice. Of course, attitudes will also be modified by positive or negative outcomes arising from performing the behaviour in question. It might be the case, therefore, that positive or negative outcomes arising from research utilisation would also impact upon respondents' attitude to research.

Whilst recognising these feedback loops in theory (i.e. from behaviour to PBC and directly from behaviour to attitude), little research has been undertaken which takes into account the impact of past behaviour on either attitudes or increasing feelings of control and/or self-efficacy. The majority of research is based on a recursive model that aims to predict future behaviour without directly considering the impact of past behaviour on the variables included in the model. One exception is the research undertaken by Reinecke *et al* (1996) who conducted a longitudinal study of adolescent condom use, and found that there was evidence to suggest that past behaviour led to an increase in perceived behavioural control. Ajzen (1991) argued that the inclusion of perceived behavioural control in the model would preclude the need for consideration of past behaviour as a separate construct, in that PBC should mediate any residual effects of past behaviour. If Azjen is correct in his assumption that PBC should mediate any residual effects of past behaviour then, in theory, one should be able to test this assumption by employing a nonrecursive model where past behaviour feeds back into those items measuring perceived behavioural control.

Whilst TPB rarely explicitly models the reciprocal relationships between behaviour, attitude and situational factors, a number of theories suggest that exploring these reciprocal relationships could be fruitful. Both Social Learning Theory (Bandura, 1977) and Social Cognitive Theory (Bandura, 1986) explain behaviour in terms of reciprocal causation; a person's internal psychological factors, the environment in which the behaviour takes place, and the behaviour itself, all operate as interacting determinants that influence each other. How people interpret the results of their own behaviour informs and alters their environments and the personal factors they possess which, in turn, inform and alter subsequent behaviour. Bandura (1986, p. 18) writes: 'Conceptions of human behaviour in terms of unidirectional personal determinism are just as unsatisfying as are those espousing unidirectional environmental determinism . . . Rather, human functioning is explained in terms of a model of triadic reciprocity in which behaviour, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other.' There are a number of theories that attempt to explain the reciprocal relationship between behaviour and attitude.

3.12.1 Cognitive Dissonance

L. Festinger in A Theory of Cognitive Dissonance published in 1957 articulated this theory. It has been one of the most influential theories in social psychology. According to cognitive dissonance theory there is a tendency for people to seek consistency among their beliefs and opinions. When there is an inconsistency between attitudes or behaviours (dissonance), something must change to eliminate the dissonance; frequently the attitude will change to accommodate the behaviour. Dissonance theory asserts that if two cognitions are relevant to one another, they are either consonant or dissonant. Two cognitions are consonant if one follows from the other, and they are dissonant if the obverse (opposite) of one cognition follows from the other. Because the cognitive dissonance, which arises from holding inconsistent beliefs is psychologically uncomfortable, this motivates the person to reduce the dissonance and leads to avoidance of information likely to increase the dissonance.

Dissonance can be reduced by removing dissonant cognition, recognising that some cognitions are more resistant to change than others. Resistance to change is more likely if it is seen to hold true in reality and where the cognition is consonant with many other cognitions. Resistance to change of a behavioural cognitive element depends on the extent of discomfort or loss experienced if one were to stop the behaviour and the satisfaction the individual experiences from the behaviour. Festinger (1957) gives the example of a habitual smoker who learns that smoking is bad for health. He will experience dissonance, because the knowledge that smoking is bad for health is dissonant with the cognition that he continues to smoke. He can reduce the dissonance by changing his behaviour, (i.e. stop smoking), or he could reduce dissonance by changing his cognition about the effect of smoking on health and believe that smoking does not have a harmful effect on health. He might look for positive effects of smoking and believe that smoking reduces tension and keeps him from gaining weight (adding consonant cognitions). Or he might believe that the risk to health from smoking is negligible compared with the danger of automobile accidents (reducing the importance of the dissonant cognition). In addition, he might consider the enjoyment he gets from smoking to be a very important part of his life (increasing the importance of consonant cognitions).

Whenever a person makes a decision each of the negative aspects of the chosen alternative and positive aspects of the rejected alternatives is dissonant with the decision. Dissonance following a decision can be reduced by removing negative aspects of the path chosen or positive aspects of the rejected path. It can also be reduced by adding positive aspects to the chosen path or negative aspects to the rejected path. Dissonance also occurs when people are exposed to information inconsistent with their current framework of beliefs. If the dissonance is not reduced by changing one's belief, the dissonance can lead to misperception or misinterpretation of the information, rejection or refutation of the information, seeking support from those who agree with one's belief, and attempting to persuade others to accept one's belief.

A further occasion which provokes cognitive dissonance, is when a person engages in an unpleasant behaviour to obtain some desired outcome. The cognition that the activity is unpleasant is dissonant with actually performing the behaviour. It is expected that dissonance would be greater the more unpleasant one finds the behaviour required to obtain the outcome. Dissonance can be reduced by exaggerating the desirability of the outcome, which would add consonant cognitions. In an experiment designed to test these theoretical ideas Aronson and Mills (1959) had women undergo a severe or mild "initiation" to become a member of a group. In the severe-initiation condition, the women engaged in an embarrassing activity to join the group, whereas in the mild-initiation condition, the women engaged in an activity that was not very embarrassing to join the group. The group was actually very dull and boring, but the women in the severe-initiation condition evaluated the group more favorably than the women in the mild-initiation condition. This paradigm is referred to as the *effort-justification paradigm* (e.g., Beauvois & Joule, 1996).

In addition, dissonance will occur when a person does or says something that is contrary to their framework of beliefs. Of course, if one received rewards for engaging in the behaviour dissonant with one's beliefs, or threats or punishment for failing to engage in the behaviour, then this provides cognitions that are consonant with the behaviour, as they provide justifications for the behaviour. This paradigm is known as the induced-compliance paradigm. Festinger and Carlsmith (1959) undertook research which tested this theory, which suggests that the smaller the reward for saying something that one does not believe, the greater the opinion changes to agree with what one has said. They found that the less money received for engaging in the counter-attitudinal behaviour, the more positive the attitude towards that behaviour becomes. This is known as the *negative-incentive effect*. There appears to be a negative relationship between the size of the incentive and the amount of attitude change in the direction of the counter-attitudinal behaviour. Research by Linder, Cooper, and Jones (1967) showed that the negative-incentive effect occurs when a person feels free to decide about performing the counter-attitudinal behaviour. However, when s/he has no option but to engage in the counter-attitudinal behaviour, the opposite effect occurs. When there is no choice about engaging in the behaviour dissonance is not aroused as there is sufficient justification for the behaviour

3.12.2 *Competing theories - Alternatives to Dissonance Theory*

(a) Self-Perception Theory

Self-perception theory (Bem, 1967, 1972) argued that dissonance effects were not the result of motivation to reduce the psychological discomfort produced by cognitive dissonance but were due to a non-motivational process whereby persons merely inferred their attitudes from their behaviour and the circumstances under which the behaviour occurred. Bem, (1972, p. 108) writes 'Individuals come to know their own attitudes, emotions and internal states by inferring them from observations of their own behaviour and circumstances in which they occur. When internal cues are weak, ambiguous, or uninterpretable, the individual is in the same position as the outside observer.' The self-perception theory explanation for the negative-incentive effect found by Festinger and Carlsmith (1959) is that people use their behaviour to judge their attitudes in those circumstances where external circumstances, such as incentives or punishments, are not seen as controlling the behaviour. So, a small incentive is not seen as controlling the behaviour, whereas a large incentive is seen as controlling the behaviour.

Research has demonstrated that self-perception processes cannot account for all effects produced in dissonance experiments. Elliot & Devine, (1994); Fazio, Zanna, & Cooper, (1977); Gerard, (1967); Harmon-Jones, Brehm, Greenberg, Simon, & Nelson, (1996); Losch & Cacioppo, (1990); Zanna & Cooper, (1974) present further experimental evidence that is consistent with dissonance theory but cannot be explained by self-perception theory.

(b) Impression-Management Theory

According to this interpretation, attitudes appear to change because people want to manage the impressions others have of them. (Tedeschi, Schlenker, & Bonoma, 1971). They try to create a favourable impression or avoid an unfavourable impression by appearing to have attitudes that are consistent with their behaviour. This theory assumes that the attitude change that occurs in dissonance experiments is not genuine and that participants in experiments only appear to change their attitudes after counter-attitudinal behaviour to avoid being viewed unfavourably by the experimenter.

Contrary to impression-management theory, however, dissonance processes do appear to produce cognitive changes. Impression-management theory cannot account for findings that show that dissonance processes that justify recent behaviour can produce physiological changes (Brehm, Back, & Bogdonoff, 1964), and it has problems explaining results obtained in paradigms other than the induced-compliance paradigm, for example, the free-choice paradigm (Wicklund & Brehm, 1976). Although researchers differ in what they believe to be the underlying motivation for dissonance effects, there is evidence that genuine cognitive changes occur in dissonance studies and that these cognitive changes are motivated by some form of psychological discomfort. The theory is however open to the criticism of being too broad and hard to prove.

Zanna and Cooper (1976, p. 703) attempt to summarise the research on cognitive dissonance and attribution and self-perception; they write; 'Dissonance theory sees man as aroused by inconsistencies among his cognitions. As in the classical arousal theories of experimental psychology.... man is motivated to rid himself of the drive-like, uncomfortable tension that accompanies perceived inconsistency. Attribution models, on the other hand, see man in a constant process of making sense out of his environment. In such models, man is viewed as a scientist, using attributional rules to infer causality in an otherwise chaotic world of social stimuli.'

Each of these theories has its merits and are useful in furthering our understanding of attitude development and change. Fazio, Zana and Cooper (1977) argue that the theories are complementary. They suggest that dissonance theory is more appropriately applied when behaviour is discrepant with a previous attitude, and attribution theory ought to be applied when behaviour is consistent with, but more extreme than, a previous attitude.

Certainly the theories suggest that one would expect to find a reciprocal relationship between behaviour and PBC/self efficacy, as well as between the performance of a behaviour and one's attitude towards that behaviour. The nonrecursive model employed in this research will attempt to explore the reciprocal relationships between past behaviour and the predictor variables included in the Theory of Planned Behaviour. Yang-Wallentin *et al* (2004) reviewed research utilising the TPB and concluded that they did not trust regression results, as they assume that there are no random and non random measurement errors. They follow Jaccard and Wan (1995) in concluding that structural equation modelling (SEM), which controls for measurement errors, is preferred. Although the decision I had made to use SEM had been made for different reasons, this lends support for the methodological approach taken. It is also apparent from the literature review that the methodology must also be able to deal with the complex interrelationships between the predictor variables. The methods employed in the data analysis will be discussed in greater detail in the next chapter.

CHAPTER 4 : THE METHODOLOGY

4.1 Introduction

The previous chapters provided the rationale behind the variables to be included in the nonrecursive model, and discussed the reasons behind the expansion of the Theory of Planned Behaviour to be tested, both in terms of variables to be tested and their inter-relationships, and the theory's inability to explicitly take into account previous experience of the behaviours. The expansion of the model, however, means that a far more complex methodological approach is necessary if I am to test the hypotheses outlined.

This chapter discusses the design and piloting of the questionnaire and the rationale for the methodological approach taken. Structural equation modelling is discussed in greater detail, specifically the testing of measurement and structural models and the notion of 'model fit.' As many of the terms used may be new to the reader, a glossary of the main terms has been included at Appendix C. An asterisk denotes those terms that are explained in greater detail in this appendix.

4.2 Research design

Where reliable and valid scales were available to measure the constructs of interest, these were included in the survey (attitude to research, organisational learning climate, need for cognition). For other measures: critical appraisal skills related to effective research utilisation, and the outcomes one might expect from the application of research evidence in one's work, the questions were developed from the research literature and refined in conjunction with advice from the Centre for Evidence-Based Medicine and researchers involved in the CASP programme. In some instances where the constructs were measured by single items, and I wished to make comparisons with previous research, the questions (and categories used) were kept as close as possible to those used in this prior research, whilst ensuring their relevance to this population. The questions related to the amount of CPD the individual undertakes; their awareness of evidence-based practice and the extent to which they believe an evidence-based approach had been adopted, would fall into this category. Demographic data was collected using the same categories as those employed by the Institute of Healthcare Management. From examination of the literature, there was no reason to believe that the sex or age of the respondent would be significant moderating variables, and were therefore not included in the pilot questionnaire.

I met the trustees to discuss the proposed pilot questionnaire. Their chief concern was that their members, whilst frequently employing research evidence in their work, may be less familiar with the term 'evidence-based practice.' It was decided to consider research seeking and research utilisation separately from evidence-based practice. Although, in reality, as well as in the research literature, it would be difficult to distinguish between the two, my focus was primarily on the utilisation of research evidence in decision making. A number of items were developed to measure the extent of research seeking and research utilisation, but the terms 'evidence-based' was avoided in these items in case it led to respondents believing it was something other than that which they were already doing, i.e. a belief that the activity, defined thus, was specific to clinicians. If they were to employ the very precise definition employed by clinical practitioners then respondents were likely to underestimate the extent to which they sought out and utilised research evidence in their own work. There was also the recognition that research evidence could not be limited to randomised controlled trials within a general management population. A far broader definition of research evidence was employed. It was defined as 'information which is obtained from critical investigation and free of unexamined personal beliefs or political ideology.' Respondents were asked to indicate the extent to which they obtained research evidence from a variety of (pre-defined) sources that had been extended and refined in the piloting of the questionnaire. Research utilisation was also defined more broadly, covering instrumental, conceptual and political uses of research evidence.

The pilot questionnaire was sent out to 100 members of the IHM. This was a stratified sample as I needed to ensure that we sampled individuals from a variety of grades and roles (i.e. clinical practitioners, clinical managers and general managers, although the number of clinical practitioners who returned the questionnaire was lower than had been expected). The pilot questionnaire contained more open questions and also asked participants to note any difficulties or queries they had as a result of completing the questionnaire.

The comments largely fell into the following three areas

1. The scales were confusing (some were based on 5 point Likert scales, others on seven). The view was that the scales ought to be standardised.

2. The definition of 'research evidence' needed to be clarified and highlighted in the questionnaire immediately before those questions to which it relates.
3. The questionnaire was felt to be too long, taking an average of 30 minutes to complete.

None of the individual items appeared problematic in terms of respondents' being unable to interpret their meaning.

The final questionnaire used a 5-point Likert scale for each of the items and included a more detailed definition of the construct 'research utilisation.' It was not possible to shorten the questionnaire without losing the ability to test all of the hypotheses I had intended. The items intended to measure the extent to which respondents believed they operated within a political environment were dropped from the questionnaire. This was a particularly long instrument and the research evidence to support its inclusion was weaker than those of other variables that were retained.

The Chief Executive of the IHM agreed to draft a covering letter to go out with the final questionnaire encouraging its completion and return. The covering letter also outlined the nature of the research and its objectives. The questionnaire can be found at Appendix D.

4.3 The sample group and data collection

2000 questionnaires were sent out to a randomly selected sample of members of the Institute of Healthcare Managers (IHM) in the Spring of 2001. The randomisation feature of the database on which the membership details were stored was employed to do this. Confidentiality had been assured in a covering letter from the IHM's Chief Executive, and respondents were provided with a stamped addressed envelope for return. 438 were returned; however, the responses from 7 of the questionnaires were not entered into the database as more than 25% of the questionnaire had been left blank. In all but two cases, this was due to respondents not realising that the questionnaire was double sided. 431 questionnaires were input into the database (a response rate of 22%). Resources did not permit sending a chase letter, which would have necessitated writing to all 2000 people originally contacted.

4.4 Preparation of the data

The final survey contained no open questions. All responses were coded and the data entered into SPSS 10. For none of the items was more than 3% of the data found to be missing, suggesting that the data were missing at random, and that, as with the pilot questionnaire, respondents had found the questions unproblematic. In terms of dealing with the missing data, where the variable of interest was made up of a single item, the response was ignored during the analysis. Where the items were summed to form a factor, or sub-factor, the missing item was assigned the mean value of the responses of all those who had responded to that particular item. However, when the analysis of the entire model was undertaken within AMOS (this was the structural equation software chosen to analyse the data; short for Analysis of Moment Structures). One of the benefits of AMOS is that it uses an approach based on maximum likelihood (ML) estimation* to deal with missing data. Arbuckle (1996) and Arbuckle & Wothke (1999) describe the extent to which ML estimation, in the presence of incomplete data, offers several important advantages over both the listwise and pairwise deletion* approaches.

Negatively worded items forming part of a scale were reversed. The scale relating to research seeking proved particularly problematic. In addition to answering each item on a 5-point scale, the respondent also had the option of noting that a particular type of research evidence was not available to them. These responses were counted and retained on the original database, but deleted from the database that would be used for the analysis.

The following testing was then undertaken prior to the analysis:

Approximately normal distribution

The commonly used approaches to estimating the parameters of structural equation models (maximum likelihood and normal-theory generalised least squares) make the assumption that the measured variables have a multivariate normal distribution. In practice this assumption is frequently ignored by researchers. Real data in behavioural research frequently fails to meet the normality requirements, yet ignoring such violations can result in unreliable goodness of fit and parameter estimates.

**** Denotes that the term is explained in greater detail in the glossary.***

It was apparent that some of the items were not normally distributed, and that it would be necessary to employ 'bootstrapping'* when these items were employed in the models to be tested. This technique was first brought to light by Efron (1979) and essentially enables one to create multiple sub-samples from the original database and then examine parameter distributions relative to each of these samples. So, for each of these sub-samples one will know the mean value, and then be able to calculate the average mean value across all of the sub samples and calculate the standard error. Violation of multivariate normality tends to underestimates standard errors moderately to severely and, as a result, regression paths and error covariances are found to be statistically significant more often than they should be. The output from bootstrapping enables one to consider the standard deviation of the item or variable in question having drawn upon these sub-samples; the standard deviation will, of course, be greater and therefore enables one to be more confident about group comparisons as one must ensure that there is no overlap in the scores obtained by each of the sub groups being compared. 200 samples were used in each case of bootstrapping I employed. The researcher must, however, still make the assumption that the sample is representative of the population of interest.

The relationships between the variables is linear

Most observed variables used in SEM are defined as being measured on a linear continuous scale. The extent to which one or both variables deviate from the assumption of a linear relationship will affect the size of the correlation coefficient, it is therefore important to check for linearity of the scores: the most common method being to produce a scattergraph (SEM does, however, allow the analysis of nonlinear relations of both observed and latent variables).

Multicollinearity

Multicollinearity occurs when the inter-correlations between variables are so high they effectively measure the same thing. As a general guide, if the correlation of any two variables exceeds .85 then one needs to consider which to include in the analysis, as it makes little sense to include both. Multicollinearity can make certain mathematical operations impossible, or, at best, render the results unstable because some denominators are very close to zero. Potential multicollinearity problems were found with one of the scales, but no other problems were identified. A detailed analysis can be found at Appendix B.

4.5 Rationale for the method of analysis chosen

In organisational research it is frequently impossible to undertake longitudinal experiments in order to speak of causal relationships between the variables of interest. Despite this often-repeated criticism of the failure of organisational researchers to meet the research standards set in the 'harder' sciences, organisations are rarely going to provide the researcher with the opportunity to undertake this type of research. Initiatives are not generally introduced at one point in time to a random sample of employees whilst all other variables, which could potentially influence the outcome of the initiative, are held constant. Additionally, researchers, particularly those in academia, are frequently limited by resource issues, and so the opportunity to engage in longitudinal research is limited. Within economics, nonrecursive structural equation modelling had been widely used to examine reciprocal relationships between constructs, and to suggest causal relationships between them. My intention was to determine is this methodological approach could be employed in organizational research.

4.6 Structural equation modelling

SEM is an extension of the general linear model (GLM) that enables a researcher to test a set of regression equations simultaneously. SEM software can test traditional models, but it also permits examination of more complex relationships and models. The GLM includes the multivariate extensions of multiple regression and ANOVA, canonical correlation and multivariate analysis of variance respectively, as well as exploratory factor analysis. Significantly, SEM enables the simultaneous evaluation of paths included in entire models. Unlike simple path analysis*, one can include more complex (or *latent*) variables within the model and the measurement error inherent in these constructs will be taken into consideration in the evaluation of the whole model: the model represents the many hypotheses the researcher intends to examine. Whilst the overall goal is to estimate causal versus noncausal aspects of observed correlations, a well fitting model cannot, however, prove causation. Klein (1998) notes that the following conditions must also be met:

- There is time precedence (i.e. X precedes Y in time).
- The direction of the causal relationship is correctly specified (i.e. X causes Y rather than the reverse, or that X and Y cause each other).
- The relation between X and Y does not disappear when external variables such as common causes of both are held constant.

In my own research structural equation modelling (SEM) was used to model the relationships between the predictor variables (individual, role and organisational). It provides a way to include a number of indicators for each latent variable and take account of measurement error in the constructs employed. Unlike multiple regression, I am also able to take into account correlated error terms* and the analysis can also be used where (as is the case here) a variable is both a criterion and a predictor.

The model to be tested, based on the hypotheses outlined in the previous chapter, suggests that research-seeking, research utilisation and evidence-based practice cannot be explained by a single perspective, but that one must examine the complex relationships between individual, role, and organisational factors. Previously researchers testing more complex models of this type had utilised a covariance structure model without latent variables (Oh and Rich, 1996). This seriously limited the type and range of variables which could be employed in the model, as many of the variables of interest (*organisational learning climate, attitude to research* etc.) will contain some degree of measurement error which cannot be dealt with within the confines of path analysis. In SEM one can separate errors in measurement from errors in equations.

Previous studies exploring the predictors of research utilisation have not included personality variables that could predispose the individual to favouring research-based, as opposed to heuristic, decision making. Path analysis would preclude the use of such complex latent variables. If evidence-based decision making is perceived to be embedded at a particular level (individual, team or organisational) then its impact cannot be ignored within the model, as this would exaggerate the impact of those other variables which were included, as well as ignoring any inter-relationships between them. Furthermore, it is also hypothesised that the model would contain feedback loops. For example, if one is predicting that the introduction of research-based decision making (or research utilisation) has a positive impact in certain areas, then these improvements might, in turn, generate a higher regard for such decision making. Building such causal loops into the model would mean that it could not be solved by ordinary regression techniques because the assumption of independence of errors is violated. Structural Equation Modelling does not rely on this assumption and is able to handle these nonrecursive models.

It is important at this stage to address the issue of nonrecursive models that are utilised to address limitations in the data, rather than being based on any underlying theory: in other words using a nonrecursive model because the data available are cross-sectional rather than longitudinal. At a very early stage in the research design, my intention had been to collect the data at two points in time, as evidence-based decision making became more widespread, and to look at the impact that this initiative was having across a number of dimensions. This would have enabled me to compare my findings with those obtained from the nonrecursive model. In reality, however, the picture was very different. In some areas evidence-based decision making had been introduced many years earlier, and any impact would already have been felt, and this would need to be taken into account in the model. In other areas, despite similar levels of training, the initiative appeared to have had little impact for a variety of organisational reasons, and there was little reason to suppose it would have progressed a great deal further within the time lag I was considering. In addition, the introduction of the skills to support evidence-based decision making was quite random, there was not a planned 'roll-out' of training, and it was inconsistent even within health authorities. It was not possible to assume that the impact of the independent variables was not present at time A, but could be measured at point B. To overcome these difficulties, a nonrecursive model was built.

As mentioned earlier, whilst such models have been used for decades in economics, there has been a relatively small amount of research in the social sciences that has employed nonrecursive models, despite the fact they are likely to represent a more realistic picture of what happens in practice. Many of the assumptions one must make for a model to be said to be truly recursive are rarely met in social science research. Firstly, one must be confident that no two variables in the model are reciprocally related, with each affecting the other. Secondly, all pairs of disturbance terms* in the model must be uncorrelated. Berry (1984, pp.8-9) notes that 'It is unrealistic to assume that no two variables in a model are reciprocally related; furthermore, given our generally high degree of ignorance about the factors represented in a model's disturbance terms, it is often impossible to provide a convincing justification for an assumption that each error term in a model is uncorrelated with all other error terms in the model.' There are many reasons for doubting that the strict assumptions required for a recursive model are appropriate; rarely can one be convinced that causation among the variables is strictly unidimensional. Despite these words of warning written over 20 years ago, the majority of researchers continue to employ recursive models in their research. Berry confirms that ignoring this reciprocal causation will mean that the resulting estimates are biased and inconsistent and thus give an inaccurate assessment of the nature of the magnitude of the causal effects. If, for example, we were to consider the effects of *attitude to research* on research utilisation, the regression weight would be far higher than if we were to simultaneously consider the reciprocal effects of research utilisation upon one's attitude.

The main reason, however, for the shortage of nonrecursive model testing in the literature appears to be the complexity of such models, specifically ensuring that the model is identified*; it meets both the rank and order conditions for identification. In some nonrecursive models it would appear that the question of identification has not been addressed (see for example Sandler, 2000) and the problems associated with non-identification are not discussed. Essentially, for a model to meet the rank order condition for identification there must be at least one predetermined variable which affects each one of the endogenous variables in the feedback loop, but which does not have a direct effect on any of the other variables in this loop. This exogenous variable is known as the 'instrument' for the endogenous variable it identifies –but only when it has a significant, direct effect on the latter and the relationship makes sense theoretically. Instrumental variables help to ensure that the equations of the endogenous variables they predict are identified. So, for a model to be identified, each equation needs to have as many instruments as there are variables in reciprocal relationships (feedback loops). Each endogenous variable in a reciprocal relationship needs its own separate instrument(s). In addition, the instruments have to be distributed in particular ways for each dependent variable to have a solvable equation; known as the rank condition. Ensuring identification for very complex models can be very difficult, although one is helped by the computer programmes now available that can provide tests for model identification. A further reason for the lack of research employing nonrecursive models is that before the introduction of techniques such as two-stage least squares and structural equation modelling, it was extremely difficult to test for such reciprocal relationships without employing a longitudinal research design. One is now able to test if two or more constructs are reciprocally related by analysing the observed covariance structure against a pre-specified nonrecursive model. As an illustration, one could take an example from economics employed when considering supply and demand. Berry (1984), for example, identifies such a model in the following way. If we wish to test whether or not supply and demand of wheat are reciprocally related, and have data taken at only one point in time, in order to identify this model we would need to identify both the 'supply' and 'demand' variables. In Berry's model, he identifies 'supply' by introducing the variable 'amount of rainfall' into the model. It can reasonably be expected to have no direct impact upon demand once we control for supply. In order to identify 'demand' he introduces the variable 'per capita disposable income'. Again, we would expect that this variable would have no direct impact upon the supply of wheat once we control for demand within the model.

Even though these new techniques make the analysis of reciprocal relationships possible using a cross-sectional design, there is still some disagreement about the validity of these analyses. Some researchers have argued that cross-sectional data employed in nonrecursive models are inferior to longitudinal research. The basic argument is that the reciprocal relationship, if it exists, should not be observed at the same time. Hunter and Gerbing (1982) argued that:

'the problem that nonrecursive causations pose in cross-sectional models can be seen by considering the implication that a two-way arrow has for indirect effects. If X and Y have an effect on each other, then X has an impact on Y, which has an impact on X, which has an impact on Y.... this cycling can go on (for) as many steps as can be imagined. In reality there is no such instantaneous cycling process.' (p. 269)

The authors suggest instead the use of a longitudinal time-lagged model to test the relationship of the constructs of interest. However, the collection of longitudinal data introduces new problems and complexities that are frequently ignored.

Wong and Law (1999, p. 71) write, 'From a pragmatic point of view, although causes should precede effects, the exact time lag between them is difficult to identify....' In other words, if the relationship is causal, then how long does it take for one variable to affect the other? They give an example where they make the assumption that it takes one month for the causal variables to have an effect on the outcome variables, and suggests that a longitudinal design with three months between data collections would not be meaningful because the causal variables that lead to the outcome variables may have changed tremendously. They conclude that, 'if the time interval between the causes and effects is sufficiently small, the cross-sectional nonrecursive model may be a viable representation of that reality.' (p. 71). Finkel (1995) argues that in some models, the assumption of cross-lagged effects is literally impossible. He gives the example of the effect of new college roommates on each other's moods, to illustrate this point. He argues that it is extremely difficult, if not impossible to conceptualise a time lagged reciprocal effect between the roommates' moods because their effects happen simultaneously. Where there are synchronous effects of this type, then it would be difficult to make the case that longitudinal data may be preferable to cross-sectional.

The use of cross-sectional data means that researchers do not have to concern themselves with what the temporal lag should be. In some instances the effect could be almost instantaneous, and, of course, in reciprocal relationships this question needs to be asked twice. Maruyama (1997) notes that the cost of selecting too long an interval depends upon how fast the variable changes; it may range from trivially underestimating to virtually missing all of the effect. If the interval selected was too short then not enough time would have passed for the causal process to occur, so no causal process would be apparent. He goes on to remark that, in many instances, it is not possible to assume that the time lags between variables are the same. When they are not, then two different time lags need to be estimated. Wong and Law (1999) also make the point that even if the exact time lag is known it may not be practically possible for researchers to measure the constructs according to the appropriate time lag owing to organisational and psychological constraints. There is also a further practical issue, particularly when conducting organisational research, that most interventions take some time to implement across the population. Even if one knew the time lag, and was confident that this was the same across the population of interest, the longitudinal study would need to take into account the fact that the intervention happened at different times for different individuals or groups.

In the nonrecursive model I shall be testing, it is impossible to know how long a time lag there would be between performing a behaviour and having that activity impact upon one's attitude towards that behaviour, or how long a time lag one could confidently claim between developing a positive or negative attitude towards a behaviour and the performance (or avoidance) of the behaviour under investigation. Whilst there is undoubtedly a time lag between these reciprocal effects, it is not possible to state with any level of certainty what that period of time would be, although with the variables which are predicted to have reciprocal relationships in the hypothesised model, one would expect a relatively short time lag. It is for these reason, that recently some researchers, such as Finkel (1995), have argued that there is merit in using cross-sectional data to test reciprocal relations.

Wong and Law (1999), whilst accepting that the testing of nonrecursive models can be justified theoretically, are concerned with those factors which affect the adequacy of nonrecursive models in capturing cross-lagged causal effects:

i. In those instances where the instrumental effects have very different regression weights to their corresponding endogenous variables, then the 'weaker' endogenous variable will have a relatively larger disturbance term, allowing random error to have a greater effect on the resulting estimates. Chances are, in such an event, that the effect from the more strongly defined variable to the weaker variable will be smaller than the reverse effect.

ii. Many researchers have concluded that nonrecursive models should allow the disturbance terms of the reciprocally related variables to be correlated (Anderson and Williams, 1992; Frone *et al*, 1994; Schaubroeck, 1990) Schaubroeck argued that:

'The residual variation of both reciprocally related variables can be expected to covary. Much of the error in predicting a reciprocally related variable (say Xi) will be due to its corresponding variable (Xj). Because Xi also causes Xj in turn, the errors in predicting Xi will become part of the estimator for Xj. Consequently, the residuals of both predictor equations will be correlated. Failure to estimate this correlation may bias the analysis to the extent that it is large.' (p. 18). It is still the case, however, that many studies still fail to specify this covariance term and there is a great deal of disagreement around whether or not disturbance terms ought to be correlated.

iii. The adequacy of the nonrecursive model will depend on the temporal stability of the true cross-lagged effects. The stronger the temporal stability, the more adequate the nonrecursive model will be.

Despite these problems the use of SEM in testing reciprocal relations of variables using cross-sectional data has been increasing in a number of areas from the 1990s. (e.g., Judge and Locke, 1993; Mathieu, 1991; Mathieu *et al* 1993; Meyer *et al* 1990; Miller *et al* 1988). We can conclude that although there are pros and cons to this application, it appears clear that sometimes it is necessary to use a cross-sectional nonrecursive model as an approximation of the cross-lagged reciprocal effects.

In summary the reasons for the method of analysis chosen are:-

- An ability to take into account measurement error in latent variables.
- An ability to subject scales to confirmatory factor analysis: a more stringent measure.
- It enables the researcher to consider the impact of past behaviour on future behaviour.
- An attempt to prevent the inflation of regression weights obtained in recursive models.
- An attempt to overcome the uncertainty over time lag from behaviour to attitude and attitude to behaviour.
- To utilise an approach which may overcome the problem inherent in organisational research, of intervening variables in longitudinal research.

It is clear that structural equation modelling enables one to test a greater number of hypotheses simultaneously; it may be thought of as a more powerful alternative to multiple regression, path analysis, factor analysis, time series analysis, and analysis of covariance. The covariance is the basic statistic of SEM, which means, in effect, that there are two main goals of the analysis; to understand the patterns of correlations amongst the variables of interest, and to explain as much of the variance as possible with the model specified.

From the outset it was apparent that this would be very much an exploratory piece of research, and I could find no precedents that would guide the development of the survey: specifically, in ensuring that the hypothesised model would be identified. If one considers the model from the economics literature provided earlier, one has clear examples of the constructs which one can be relatively certain will identify the variables in the recursive relationship. In the social sciences we have no such precedents, and so run the risk that the final model will not be identified.

4.7 Interpreting the output from structural equation models

The 'goodness of fit'

The main interest in structural equation modelling is the extent to which the hypothesised model 'fits' the sample data. There are a number of model fit criteria, and it is generally accepted that one should not rely on only one or two of these, but should report several. Occasionally, different aspects of the results point to differing conclusions about the extent to which the model actually matches the observed data. Below I have described those that I will be reporting throughout the analysis.

Chi-square (x2)

The most widely used overall test of fit assesses the magnitude of the discrepancy between the sample and fitted covariance matrices. For example, let us suppose that we have obtained a goodness of fit chi-square statistic for an over-identified model* of 20.32 with 6 degrees of freedom. This is significant at the .001 level which tells us that this model is significantly worse than if it had six more paths and was just-identified*. Essentially, it appears that we have a poor fitting model. A non-significant chi-square value means that the overall fit of the model does not differ statistically from that of a just-identified version of it. Essentially, low and non-significant chi-square values are what one seeks.

Whilst this is the most popular way of evaluating model fit, the problems associated with it were recognised quite early. A non-significant chi-square test indicates that the data fits the model (notwithstanding the fact that there may be other competing models which obtain similar results) but this is a rare occurrence as sample size increases. With sample sizes over 200 the test has a tendency to indicate a significant probability level even when differences between observed and model-implied covariances are slight. In fact, the value of the x2 statistic for a particular model (and its related data) will change simply by specifying a different sample size. Because of this problem values of other fit indexes are more standardised and less sensitive to sample size than the chi-square. In the past 15 years a whole array of tests of overall fit of SEM models has emerged. It is safe to say that there is, as yet, no general agreement about which of the many fit indices ought to be reported, and in which circumstances. As a result most investigators encourage reporting multiple indices of overall fit.

Most of the goodness of fit criteria have been formulated to range in value from 0 to 1; the higher the score the better the fit –with zero indicating no fit and 1 a perfect fit. At present, there exists no empirical or statistical basis for choosing a particular cut-off point above which one can say one has a well-fitting model. Bentler and Bonnet (1980) proposed a value of .90 for normed fit indices that are not parsimony adjusted, and this is generally well accepted. Certainly one would need to justify a lower score if one was to make the argument that the model was well fitting.

Hoyle and Panter (1995) suggest fit indices that ought to be included:

i. The chi-square, accompanied by degrees of freedom, sample size and p value
ii. The Goodness of fit index (GFI) –also an index of absolute fit and is moderately associated with sample size (as with the chi-square). It does however have intuitive appeal, as it is familiar to the R2-value reported alongside F-values associated with multiple regression models.
iii. In terms of incremental fit indices the authors suggest reporting at least two. I have chosen to report Bollen's (1989) incremental fit index (IFI), which performs consistently across maximum likelihood and generalised least squares estimations, and the comparative fit index (GFI). The GFI is considered preferable to other options available, as its values too fall within the familiar normed (0-1) ranges and are more easily interpretable.

RMSEA

I have also included the root mean square error of approximation (RMSEA), which has only recently become recognised as one of the most informative indices. The RMSEA takes into account the error of approximation in the population and asks the question 'How well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?' (Browne and Cudeck, 1993 pp. 137-38). The index is sensitive to the number of estimated parameters in the model (i.e. the complexity of the model), so parsimony is an important criterion.

Hoelter

Finally, I have also reported Hoelter's fit statistic. This focuses directly on the adequacy of sample size rather than on model fit. This is particularly important when considering more complex models or comparing sub-groups. Its purpose is to determine whether or not the sample size is sufficient for the researcher to accept the chi-square results. Hoelter (1983) suggested that the Hoelter value should exceed 200 if one wishes to be confident that the sample size is satisfactory in terms of the proposed model.

For ease of reference I have listed the fit measures below and the generally accepted ranges, which indicate good/moderate or poor fit. With the chi-square, of course, one is ideally looking for a non-significant value, although this is frequently not obtained –especially with large sample sizes.

Goodness of fit index (GFI)	>.09 indicates good fit
Incremental fit index (IFI)	>.09
RMSEA	<.05 = good fit
	.05-.08 = reasonable fit
	.08-1 = mediocre fit
	>1 = poor fit
Hoelter	>200

Although listed above for the sake of completeness, note that Hoelter's fit statistic is substantially different from others reported as it provides one with information on the adequacy of the sample size, rather than model fit.

One must also consider the confidence levels around the fit measures; if they are too large, then the model is imprecise. AMOS reports a 90% confidence interval around the RMSEA value. A narrow confidence interval would argue for precision of the RMSEA value in reflecting model fit in the population.

Models with good fit indices may still be poor based on other measures such as the r-square* and factor loadings*. The fit measures do not relate to how well the latent variables or item measures are predicted. So, one also needs to pay attention to the predictiveness of the model. Are the structural path loadings of substantial strength as opposed to just statistically significant?

The parameter estimates/regression weights

These terms are interchangeable, and refer to the size of the correlation, or covariance, between two variables. If, for example the standardised regression weight between variable X to variable Y was .30, this indicates that (within this particular model) X explains 9% of the variance in Y. Parameter estimates should exhibit the correct sign and size, and be consistent with the underlying theory. Not all proposed relationships between variables will be significant. One can determine whether or not the relationship is significant by examining the output. If the critical ratio exceeds 1.96 the regression weight is said to be significant (.05

level of significance). Klein (1998), whilst acknowledging that there are few guidelines on what constitutes a large or small effect, suggests that standardised path coefficients with absolute values less than .10 may indicate a small effect; values around .30 a medium effect; and those greater than .50, a large effect.

Until recently, it was generally expected that standardised paths should be at least .20 to be considered meaningful. In the social sciences, however, where the use of structural equation modelling is relatively new, one frequently comes across regression weights which are lower as the (social) theory behind the development of these more complex models is often in its infancy.

Examination of the critical ratios will, of course, also identify which paths to drop, i.e. those lower than 1.96 are irrelevant in terms of the hypothesised model, not being significant. Although they should be taken out for the sake of parsimony, it should be noted that this action will raise the chi-square, making the model less well-fitting.

Identifying Mis-specification

The output from AMOS provides two pieces of information that enable one to identify if, and where, the proposed model is mis-specified:

Standardised residuals

Any discrepancy between the hypothesised model and the actual covariance matrix from one's sample will be found by an examination of the residual matrix.

There is one residual for each regression weight. Standardised values >2.58 are considered too large.

Modification indices

This output provides information for any parameters (variances, covariances and regression weights), which were fixed to zero. In other words, where the researcher hypothesised that there would be no significant relationship between two variables. It provides information on what the chi-square change would be, should you allow the value to be freely estimated (i.e. if one were to specify a relationship between the two variables in the model). Any additions to the model, however, must be justifiable theoretically; it is pointless to add parameters suggested by the modification index simply to improve model fit.

The variance explained by the model

The squared multiple correlations provided for each endogenous variable* in the model represents the amount of variance that is explained by the predictors of that variable. This can be separated into direct and indirect effects if requested in the AMOS output. For example, using the earlier example of supply and demand for wheat, rainfall will have an indirect impact upon demand, via supply, whereas supply will have a direct impact upon demand.

4.8 The measurement models

Confirmatory factor analysis examines the extent to which the items in any given scales are explained by the underlying latent construct. The factor loadings indicate the amount of variance the latent variable explains for each of the items included in the scale. It is assumed that the latent variable is a cause of the item scores.

The concepts of convergent validity and discriminant validity are central in SEM. A measurement error correlation reflects the assumption that the indicators measure something in common that is not represented in the model, i.e. multidimensionality. Another form of multidimensionality is where indicators load onto more than one factor. Where this occurs, one would expect to find a poorly fitting model with a high chi-square reported.

Multiple group confirmatory factor analysis

Where one is suggesting that a moderator variable affects the relationship between the factors and their indicators, common practice is to constrain the factor loadings to be equal across groups – if the fit is not significantly worse, then the two groups are comparable. If the fit is worse, then you need to check each factor loading to see where they are differing. Each of the latent variables will be checked to ensure that they are comparable across the sub-groups when I come to operationalise the variables. This concept will be explained in greater detail in the next chapter, as it is central to the operationalisation of the variables included in the model.

4.9 The structural model

Once the researcher has tested each of the measurement models to be included, the second step is to test the full (or structural) model. Here, the researcher could employ path analysis if s/he has only a single observed measure of each variable. In structural models we are essentially dealing with the relationships between the variables included in the model. In most instances, however, the researcher will want to consider latent variables within the structural model. Essentially the analysis will need to take into account measurement errors within the latent variables and identify the factor loadings for each, whilst simultaneously calculating the parameter estimates between each of the variables in the model. The structural model, therefore, enables one to test a number of hypotheses simultaneously: whether these are hypotheses regarding the reliability of measurement instruments, or the relationship between two or more constructs.

4.10 Item Parcelling

In those instances when I was considering the full nonrecursive model, the number of items associated with each latent construct in my proposed model meant that the number of parameters was too high with respect to the sample size. Whilst it is generally necessary to have at least three indicators of the latent variable, some of the constructs (such as *need for cognition*) have as many as 18 indicators. It would be necessary to reduce the number of items attached to some of the latent variables if I am to test the whole model. The subject to parameter ratio should never be less that 5:1, i.e. there should be a minimum of five subjects to each relationship between variables one intends to measure (Klein, 1998). With 420 in the sample, the parameters are limited to around 84 as a maximum; this is obviously even smaller when one looks at subsets of the data.

The alternative to item parcelling would have been to reduce the number of variables in the model. The problem here, of course, is that a key predictor may be omitted. This has the same effect as omitting a predictor variable from a regression equation; the estimates of causal effects of those variables included in the model will be biased. If the omitted variable was significant, the variables retained in the model would be either under- or over-estimated, depending upon their relationship with the omitted variable. A fine line must be trodden between attempting to take into account every possible predictor, thereby making the model overly complex, and at the same time ensuring that all key predictors identified in the literature are included.

Although not without its problems, it has become increasingly common to use 'item parcels'* in SEM. One option is to take a single item from the scale and specify the error variance in that single variable, using a value obtained from past confirmatory analysis research. The advantage is that you have a (possibly!) error-free latent variable without having to have multiple indicators of the latent variable. The problem, however, with this approach is that few scales have been subjected to confirmatory factor analysis and so there is little hope of getting a correct value for the error term. One could also use a subset of the scale, selecting a number of items from the scale (generally those with the highest factor loadings) and arguing that, as reflective indicators of a construct, they are fairly interchangeable. The argument against doing this is that it can leave the factor poorly defined.

It is important to note that parcelling is only possible (theoretically rather than statistically) where scales are found to be unidimensional. The researcher must test whether or not this is the case by employing confirmatory factor analysis. If the scale is not unidimensional (and it is important that one demonstrates the results from the confirmatory factor analysis), then it is not possible to justify forming a composite from all of the items. It may, however, be possible to form a parcel from a subset of them. Here one retains a number of indicators with high loadings. These items may then be summed to form one variable, and an error term computed for that parcel. Of course, the danger is that you may not be measuring what you initially believed you were measuring. The construct may be far narrower. It is vital, therefore, that the way in which the variables were operationalised is made explicit. The reader can then make his or her own assessment about the extent to which they believe the items retained adequately reflect the construct under consideration.

In order to reduce the number of parameters in the model in my own research, only those indicators with the highest loadings were used in the structural model. Where sample size allowed, the highest loading items were used. When the groups were compared, however, those items were summed and the resulting 'parcel' became the unit of analysis. The disturbance term was then set to 1 minus the reliability x the variance, in order to take the measurement error of the scale into account in the analysis. It gives an approximation of the variance in the parcel due to error.

There are a number of advantages to parcelling; parcels tend to be more reliable than individual items, they are more likely to be continuous and normally distributed and they reduce the number of parameters to be estimated, the latter benefit producing a smaller parameter to sample size ratio. Despite these advantages, it is undeniable that the use of item parcels means a less stringent test of the model than one where individual items are utilised as it can hide sources of model misfit. This misfit is generally the influence of some unmodelled secondary effect which parcelling can disguise. Of course, it might be possible to model some secondary sources where these are evident (an example would be to model the influence of positively and negatively worded questions), but the secondary influences are not always this obvious.

Marcoulides and Schumacker (2001) conducted a review of the use of parcels and found that in many cases the use of item parcelling was motivated by the improvement in fit that can be obtained through the use of this practice. They suggest that the increases in fit are, however, largely obtained through masking model mis-specification of some kind. They note that the uninformed and uncritical use of parcelling may have resulted in poorer, rather than greater, understanding of the relationships among sets of items. They conclude, however, that when one is concerned with structural, rather than measurement models, then item parcels are more defensible. In my own research the chief concern is a better understanding of the impact of certain variables on research utilisation and evidence-based practice, and the outcomes arising from those behaviours, rather than scale development. This is not to suggest, however, that the researcher is at liberty to choose the items to be included at random.

It is critical, when using item parcels, to provide a full explanation of the parcelling process. This should include: the specific items in the parcel, how one established the unidimensionality of the items in each parcel and the distributional characteristics of the items as well as the parcels. This will be discussed in more detail in the next chapter with is concerned with operationalising the variables.

4.11 Self-report questionnaires

There are well-founded concerns about the use of self-report measures in organisational research, and it is important that researchers take steps to reduce the problems associated with such measures, although they cannot be completely overcome. The problems of common method variance* are well known. When both measures come from the same individual, particularly when collected at the same point in time, at least some part of the relationship between the two variables may be due to an exogenous variable attributable to the individual, and not a 'real' underlying relationship. For example, the individual may have been tired or demotivated when completing the questionnaire, and this could influence all of the variables of interest, usually in the same direction, and lead to an inflated correlation between them. It may lead to spurious correlations, where the relationship between the two variables is explained entirely by a variable that has not been included in the model. At least some of the covariance may be accounted for by, for example, the need to appear to be consistent in responses, a transient mood state, the motivation to provide responses consistent with accepted wisdom (for example leadership style and organisational commitment) and also the individual's predilection to respond in a way they deem to be 'socially desirable'. The usual format of the questions used in the Theory of Planned Behaviour could be said to exacerbate the problems of common method variance, as respondents are likely to attempt to be consistent in their responses.

Whilst no one procedure can eliminate these problems of common source variance, Podsakoff and Organ (1986) suggest the following procedures (in order of preference):

i. Obtain multiple measures of the conceptually crucial variables from multiple independent, sources -preferably using multi methods. Of course, when we are dealing with perceptions and opinions, as in this research, this is not a viable option. The individual's behaviour results from their subjective perceptions and interpretations of the environment, rather than some objective reality we can identify simply by asking more people the same questions. It would also not be possible, for practical reasons to observe each participant over a long period of time to monitor their use of research evidence. Even obtaining an external measure of respondents' behaviour from those with whom they work, would have been extremely difficult, and likely to be less reliable than the individual's own self-report. One is therefore reliant upon a degree of honest reporting in questionnaires where anonymity is assured.

ii. If conceptually appropriate, data can be aggregated to a larger unit of analysis, using part of each unit to estimate the dependent variable, and another part to estimate the independent variable. Identifying a meaningful unit of analysis is key here, even where one has the sample size to make this a viable option. It would be possible, for example to do this when exploring differences between (for example) numerous departments; however, there would need to be a large number of meaningful subgroupings. There may also be theoretical reasons that limit the level of analysis. In this research the individual is the unit of analysis, and it would not be meaningful, or practical when considering the numbers of variables in the model, to utilise a larger unit of analysis.

iii. Taking measures from the same subjects at different times, preferably with different scaling formats and different settings. Again, this would have huge resource implications.

iv. Scale trimming. Eliminating items that appear to overlap two or more constructs in order to avoid similar questions appearing in two separate scales, which would obviously lead to a greater covariance between the two variables. Confirmatory factor analysis goes some way towards enabling the researcher to establish that s/he is in fact dealing with discrete constructs. Common variance, i.e. variance which a particular item or items in a scale has in common with items from another scale, which is not explained by the theory which has led to the development of the model would lead to a poor fitting structural equation model. For example, social desirability may not be explicitly modelled, but a number of items in the model (those where social desirability has led to common variance) would appear to share common variance; i.e. one would obtain a better fitting model if either this construct *was* explicitly modelled, or the disturbance terms were allowed to correlate. The modification index included in the output would indicate that the disturbance terms of two or more of the items ought to be correlated and the fit would generally be poor. It is important, therefore that any disturbance terms which are correlated in the model have a sound theoretical basis.

v. Report results from a test of the single factor hypothesis as an explanation of the intercorrelation of the variables of interest. The authors note that, whilst such a test cannot be interpreted unequivocally, it can provide a useful insight for the reader. The output from structural equation modelling, which includes testing both the structural model and the measurement models contained within it, provides a more rigorous (although certainly not failsafe) test of this hypothesis.

4.12 ***Summary and conclusions***

There are problems associated with both longitudinal and cross-sectional research designs, although the problems associated with longitudinal research (aside from the resource implications) are less well understood. Longitudinal research is frequently not an option in an organisational context for the reasons outlined, and my intention is to determine the extent to which the method of analysis chosen would enable me to utilise cross-sectional data to test the hypotheses regarding causation. Nonrecursive structural equation modelling may also enable the researcher to identify reciprocal relationships between variables, and consider the impact that past behaviour may have on future behaviour, as well as the mechanisms through which this occurs.

The operationalisation of the variables utilising confirmatory factor analysis in structural equation modelling provides a very stringent test of the variables to be modelled, but is only infrequently adopted in organisational research. It is this analysis that I discuss in the next chapter in order to give the reader a detailed awareness of the items and constructs included for analysis and the reasoning behind their utilisation.

CHAPTER 5: OPERATIONALISING THE VARIABLES

5.1 Introduction

The process of deciding upon the methodology was a torturous one. If I was to suggest that quantitative methods could have a place in what could be regarded as 'soft' managerial decision making, then I needed a methodological approach that enabled me to make causal statements about the variables that are likely to promote evidence-based (or research-based) decision making in organisations. To do so requires an extensive search of the literature so that one can be sure that all appropriate variables have been included, a methodological approach which enables one to speak of 'causal' relationships between variables (more on this later), and variables which can stand up to more rigorous analysis than is usually the case when exploratory factor analysis or principal component analysis are the most widely used approaches. Variables subjected to confirmatory factor analysis within a structural equation model are few and far between in organisational research and some required development. This was done in conjunction with the Centre for Evidence Based Medicine, where Professor Geddes was able to provide guidance on the requisite skills and expected outcomes. I was unfamiliar with structural equation modelling at the outset, but it appeared to meet all of the requirements I had set myself, including being able to take account of past experiences through the employment of nonrecursive modelling.

It is essential that the variables tested meet a number of requirements, and so a great deal of care must be taken to ensure the constructs employed in the model either meet these requirements, or that appropriate statistical methods are employed to deal with any deviations. Specifically, one must test for multicollinearity, ensure that the factors employed are unidimensional, test that the relationships between variables are linear and also have an approximately normal distribution, as well as ensuring that the scales used are comparable across the sub-groups to be compared. A key issue in this research was the failure of a small number of the items to demonstrate a normal distribution; it was necessary to employ 'bootstrapping' in those instances where this was the case. The way in which the variables were operationalised is essential to understanding the model, and to enable the reader to reach his or her own conclusions about whether the items employed adequately represent the variables of interest.

I will consider each of the variables in turn, and so it will be helpful to begin with an overview of the predictor, outcome and moderating variables in the model. The specific behaviours, which will be considered separately in the analysis, are:

- research seeking
- research utilisation
- evidence-based decision making
- political use of research evidence

***Table 5.1** – Predictor, outcome and moderating variables*

Predictor variables	Outcome variables	Moderating variables (Group comparisons)
Attitude to research	Perceived improvements	Role (clinical/non-clinical/practitioner)
Need for cognition		CASP trained
Aspirations		CPD undertaken
Experience		
Education level		
Critical appraisal skills	Critical appraisal skills	
Perceived skill level		
Encouraged/rewarded		
Managerial influencing style		
Perceptions of use by Healthcare Managers		
Extrinsic perceived behavioural control (time, access, authority)		
Grade		Grade
Decision type (strategic/tactical)	Decision type (strategic/tactical)	
Organisational learning climate		

Note that the literature review highlighted that a small number of the variables had been modelled as both predictor and outcome variables. This would be tested in the analyses.

5.2 The behaviours to be modelled

5.2.1 *Research seeking*

Respondents were asked how frequently they sought out or requested research evidence from a number of sources, and the responses were subjected to confirmatory factor analysis to determine whether or not we were dealing with a unidimensional construct that could represent the extent of research seeking undertaken by the respondent. The categories listed were:-
More than 12 times a year, 6-12 times a year, 1-5 times a year, less that once a year, and never. Respondents were also given the option of noting that the resource was not available to them.

Table 5.2 *Research seeking*

	More than 12 times a year	6-12 times a year	1-5 times a year	Less than once a year	Never	Resource not available
Internet searches	45%	15%	27%	6%	4%	4%
Organisational/professional library	22%	23%	32%	13%	6%	4%
Management/professional journals	52%	21%	19%	5%	2%	1%
Academic/research journals	21%	19%	27%	17%	13%	3%
Evidence-based journals (e.g. Bandolier, Evidence-	14%	16%	23%	17%	26%	5%

Based Mental health)						
Internal (i.e., organisational) evaluations /research evidence	19%	20%	33%	13%	9%	5%
External best practice guidance or evaluations	24%	29%	31%	7%	5%	5%
Electronic databases (e.g. Medline/Embase)	16%	13%	26%	17%	22%	6%

Table 5.3 *Research seeking – factor analysis*

Factor Matrix

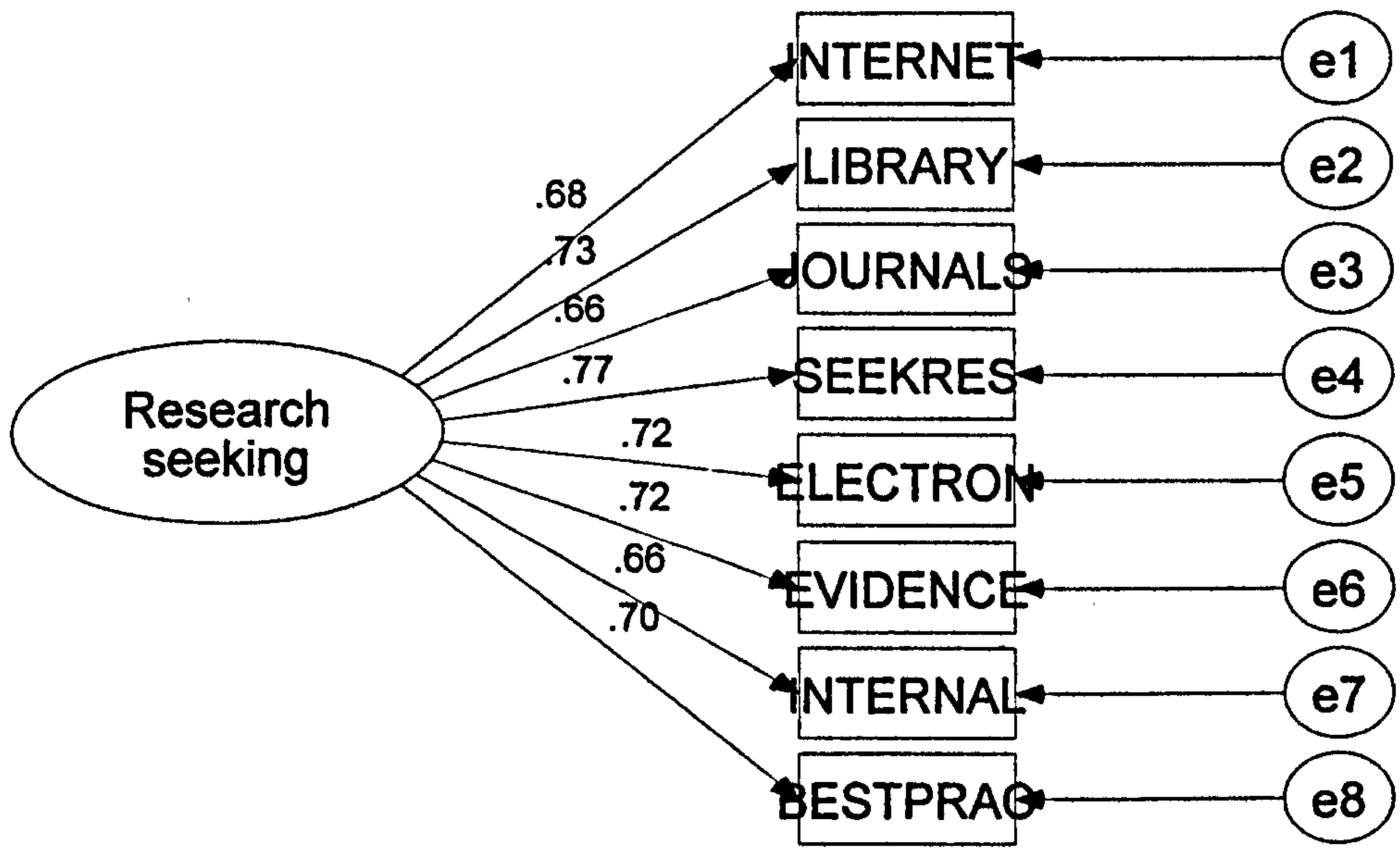
	SEM TAG	Factor
		1
Academic/research journals	RESEARCH	.778
Organisational/professional library	LIBRARY	.737
Evidence-based journals (e.g. Bandolier, Evidence-Based Mental health)	EVIDENCE	.705
Electronic databases (e.g. Medline/Embase)	ELECTRON	.700
External best practise guidance or evaluations	BESTPRAC	.689
Internet searches	INTERNET	.681
Evidence-based journals (e.g. Bandolier, Evidence-Based Mental health)	JOURNALS	.677
Internal (i.e., organisational) evaluations /research evidence	INTERNAL	.674

Extraction Method: Principal Axis Factoring.

a 1 factors extracted. 4 iterations required.

The results would appear to suggest that we are dealing with one construct with generally acceptable loadings onto the construct of interest. Confirmatory factor analysis was then undertaken in AMOS, (the SEM software utilised) and the following results were obtained:

Figure 5.1 *Amos output - Research seeking*



Chi-square = 129.549

Degrees of freedom = 20

Probability level = 0.000

RMSEA .102

Hoelter 98

(Note that the error terms explain the amount of variance in that particular item which is not explained by the latent construct (in this case research seeking).

It would appear from the above results reported from the confirmatory factor analysis undertaken within AMOS, that the measurement model is not a good fit when all items are included. This is not uncommon when a scale contains even a relatively high (i.e. >5) number of items. Even the most well-used scales in the medical and social science literature frequently fail when subjected to this more stringent analysis. There seem to be very few multi-item scales that statistically fulfill the requirements of a structural equation model test or (dis)confirmatory factor analysis. Multi-item scales tend to be reflecting more real-world processes than a factor model is able to account for. It is not, however, possible to then reduce the number of variables in the structural model by simply summing the items in the scale, when we know that the scale is problematic to begin with. Parcelling would merely disguise these problems. The number of items would therefore need to be reduced, and the measurement model re-tested. Initially one has to address the question of how one should go about reducing the number of variables if one is still to adequately reflect the construct of interest. Other factors need to be taken into account in addition; the regression weights as well as the degree of cross loadings between the disturbance terms or residuals. Here we may be dealing with common variance between two or more items, which is not explained by the latent construct of interest.

The item relating to electronic databases (e.g. Medline/Embase) was dropped, as the modification index suggested that it had a significant amount of unexplained variance in common with cross loadings with 'searching of evidence-based journals' (e.g. Bandolier, Evidence-Based Mental health) and 'internet searchers for research evidence'. It seems likely that the two former items are subsumed under the more general construct of 'internet searches for research evidence', as this is how these information sources are most commonly accessed. Internal (i.e. organisational) evaluations of research evidence was dropped as it had a lower regression weight. One explanation for this is that people did not generally regard 'internal evaluations' as meeting the requirement that the research was obtained from critical investigation and free of unexamined personal beliefs or political ideology, although this can only be speculation at this stage. Conceptually, the items remaining appear to be sufficiently broad to still reflect the latent variable of interest, i.e. 'research seeking'. The remaining items were then tested in a structural equation measurement model, and the model was now found to be a good fit.

Internet searches

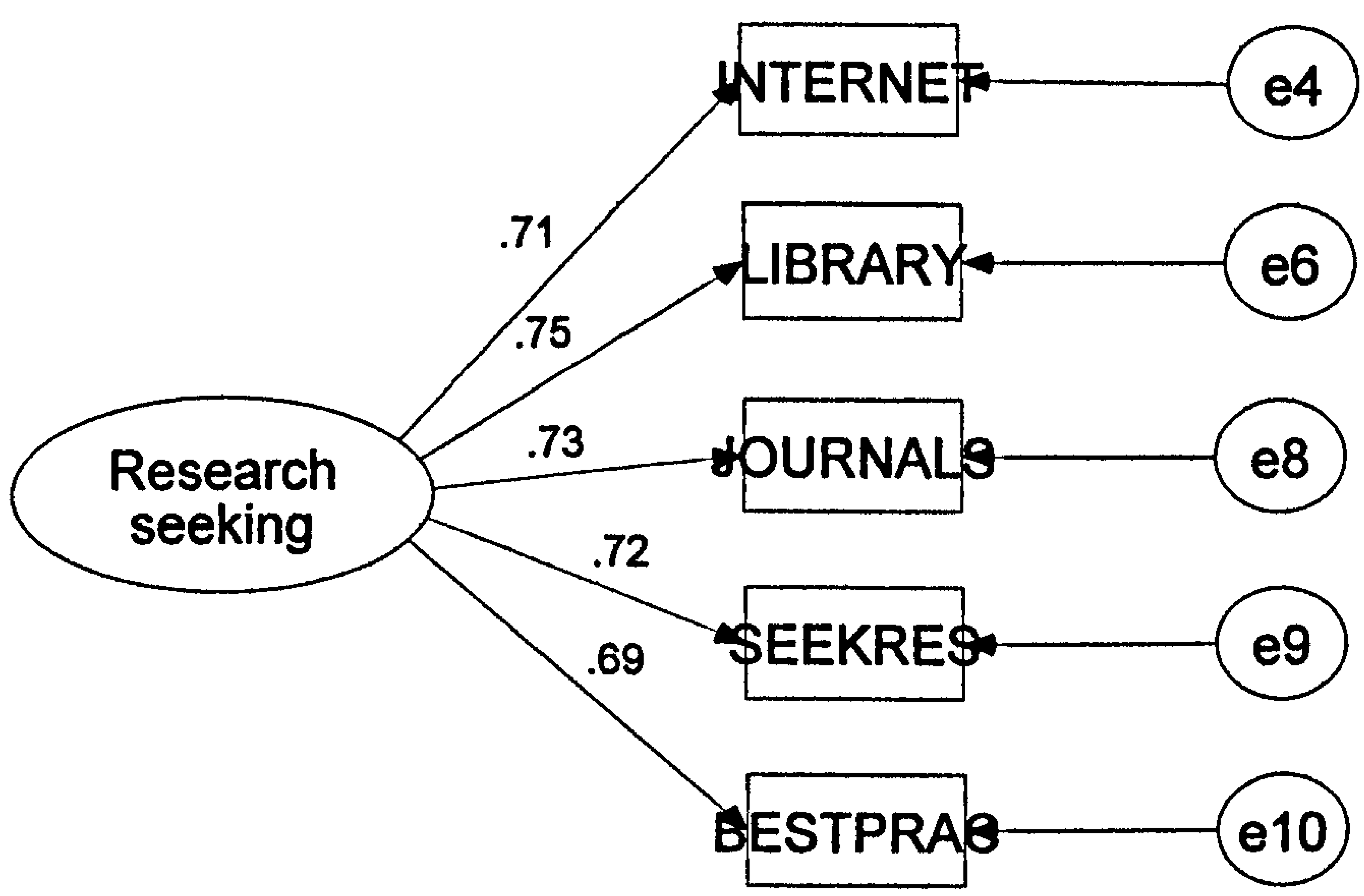
Organisational/professional library

Evidence-based journals (i.e. those whose purpose it was to combine the evidence from academic journals and summarise the implications for practice).

External best practice guidance or evaluations

Academic/research journals

Figure 5.2 *Revised Amos output - Research seeking*



Chi-square = 8.654

Degrees of freedom = 5

Probability level = 0.124

GFI .99 IFI .99

RMSEA .00

Hoelter (.05) 516

The model is well-fitting and the parameter weights are also acceptable.

In order to maintain an acceptable sample size to parameter ratio, when testing this variable in the larger model, it will be necessary to sum the items and set the disturbance term to 1 minus the reliability x the variance of the scale, to take into account the measurement error inherent in any scale.

The items making up the scale are not normally distributed, and it will be necessary to employ bootstrapping in those instances when this variable is included in the structural model. In this particular model the Bollen-Stine bootstrap* (testing the null hypothesis that the model is correct), P = 0.244. In other words, consistent with our chi-square results, the hypothesised model appears to be well fitting.

Group comparisons

It is necessary first of all to discuss how significant differences between groups are identified within SEM. It is, as discussed earlier, important to ensure that the factor loadings of items on their respective latent factors do not differ significantly across groups to be compared. If significant differences are found between groups, it suggests that the meaning of the variable is not the same between these groups, even though they are meant to represent the same construct.

In testing for multi-group invariance, a baseline chi-square value is derived by computing model fit for the pooled sample of the groups to be tested. One then constrains the model parameters to be equal across groups. The model is then re-tested in order to obtain a chi-square value for the constrained model. A chi-square difference test is applied to see if the difference is significant. If it is not significant then the conclusion is that the model *does* apply across groups and does not contain any significant differences with respect the parameters in the model. One can conclude that the meaning of the construct is the same (or sufficiently similar that it need not be a concern), in the two groups being compared.

If the differences in the chi-squares are significant, the process of identifying where these differences lie begins. One generally starts with the factor loadings and then later the structural arrows linking factors. This can be a long process as, in turn, each parameter is constrained to be equal between the groups, and the chi-square test is repeated. If the chi-squares are not significantly different the parameter remains constrained and the researcher moves on to constrain the next parameter and again runs the chi-square test. This process continues until all those parameters that are non-invariant in the model have been identified, and they are then no longer constrained to be equal. When the parameters are no longer constrained the researcher can check the critical ratios for differences provided in the AMOS output. Differences between groups for any given parameter in the model must have a critical ratio greater than 1.96 if they are to be regarded as significant.

Research seeking was found to be invariant across the groups to be tested. This is not surprising, as there is little reason to suppose the meaning of the construct would differ significantly between groups: it is more common to find differences in the structural, rather than the measurement, models. In fact, I could find evidence of group differences in very few of the measurement models tested. Those where differences were found are highlighted below.

5.2.2 ***Research Utilisation – conceptual and instrumental research utilisation by the individual respondents.***

This variable was made up of the following items:

A16 *Research evidence is translated into significant, practical action in the workplace (instrumental)*

A18 *Research evidence is used to keep one's professional/managerial knowledge base updated (conceptual)*

A20 *Research evidence is used to develop more effective policies and procedures (instrumental)*

A21 *Research evidence is used to gain a better understanding of work related issues (conceptual)*

Table 5.4 *Research Utilisation*

	Always	Frequently	Occasionally	Rarely	Never
A16	4%	29%	50%	14%	3%
A18	10%	44%	35%	8%	3%
A20	11%	43%	37%	7%	3%
A21	7%	44%	39%	8%	2%

Again, factor analysis would suggest that we are dealing with one underlying construct.

Table 5.5 *Factor analysis – Research utilisation*

Factor Matrix

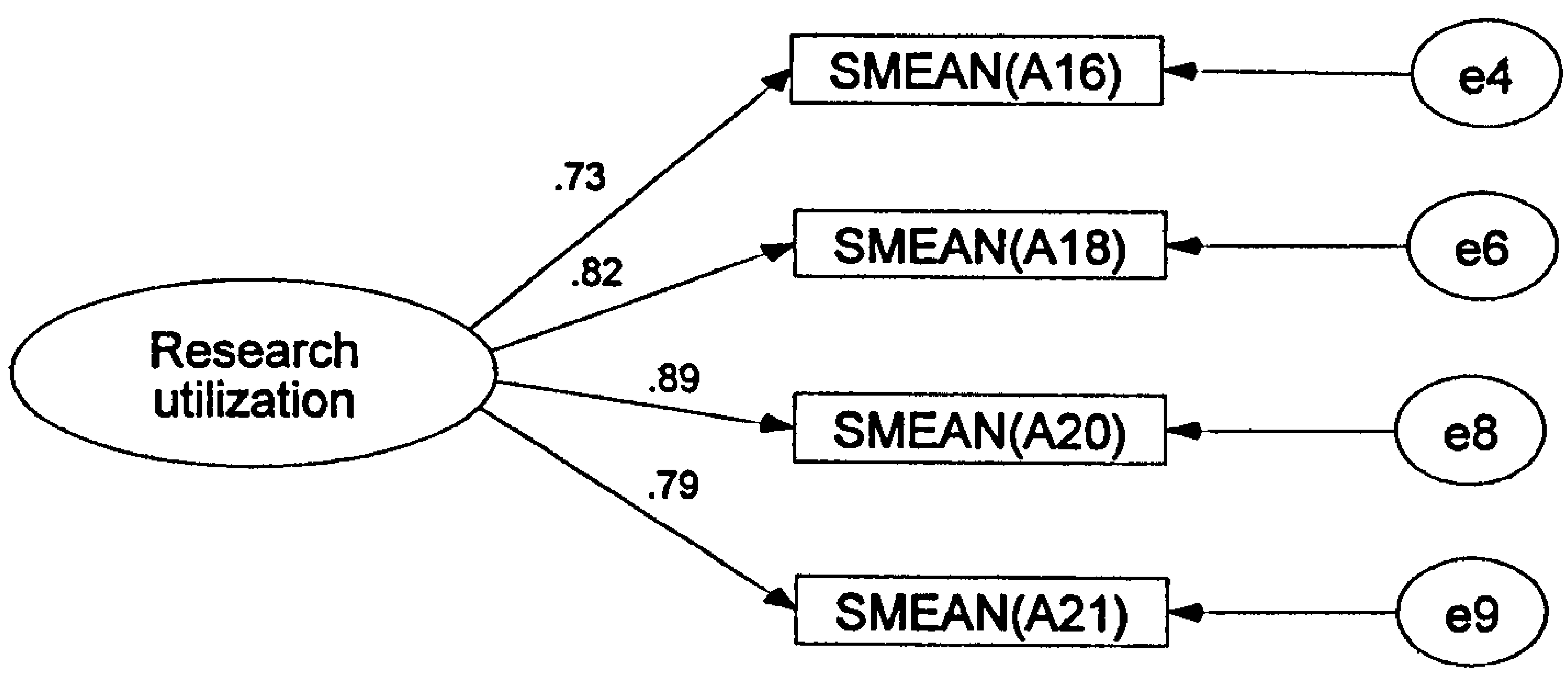
	Factor
	1
A20	.889
A18	.829
A21	.781
A16	.736

Extraction Method: Principal Axis Factoring.
a 1 factor extracted. 7 iterations required.

When all four items are included in the measurement model within SEM, however, we obtain the following results:

Certainly both the principle axis factoring and the measurement model below, suggest that we are not dealing with two distinct sub-factors of conceptual and instrumental utilisation.

Figure 5.3 Amos output – Research Utilisation



Chi-square = 8.981

Degrees of freedom = 2

Probability level = 0.011

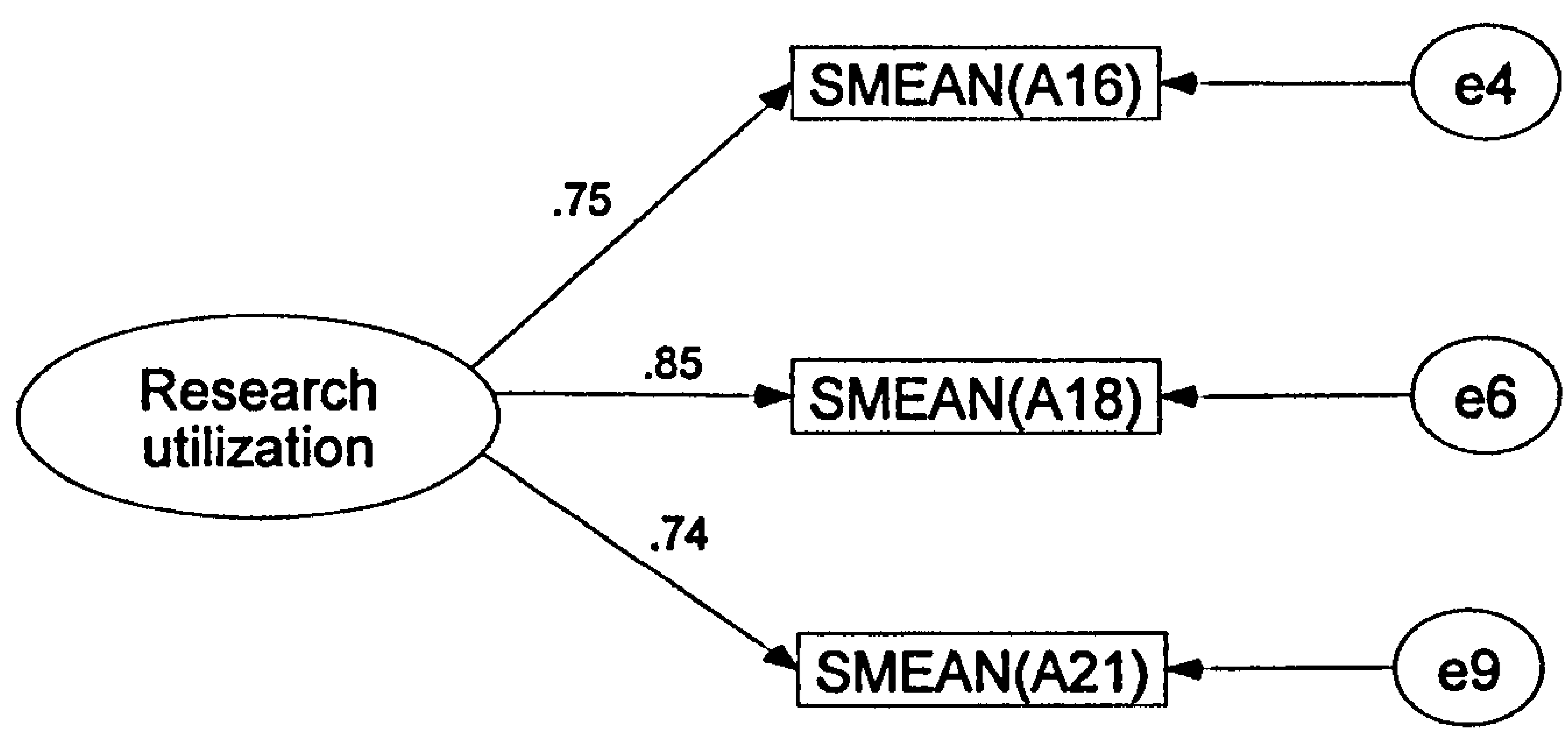
GFI .99 IFI .99

RMSEA .093

Hoelter 269

The model is not a good fit, apparently due to the cross loadings related to the item *'Research evidence is used to help ensure more effective policies and procedures.'* The remaining three items were retained in the model, and the analysis leads us to assume that we are dealing with one construct relating to research utilisation. There does not appear to be a problem with the distribution of the variables when combined in this way to measure *research utilization.*

Figure 5.4 Revised Amos output – Research Utilisation



The model was re-tested to ensure that it was a good fit. One can also see that the regression weights are of an adequate size, although it is not possible to obtain a chi-square score with only three items in the scale.

5.2.3 Political utilisation of research evidence

Participants were asked the extent to which:

1. *Research evidence is manipulated or ignored in order to justify decisions really made on other grounds.*
2. *Research evidence is only used when it suits the needs of those in positions of authority.*

Table 5.6 ***Political utilisation of research evidence***

Question	*Always*	*Frequently*	*Occasionally*	*Rarely*	*Never*
1-Self	*0%*	*1%*	*18%*	*42%*	*40%*
2-Self	*1%*	*5%*	*28%*	*42%*	*24%*
1-team	*0%*	*5%*	*24%*	*43%*	*29%*
2-team	*1%*	*9%*	*35%*	*39%*	*17%*
1-organisation	*1%*	*8%*	*32%*	*37%*	*22%*
2- organisation	*3%*	*14%*	*36%*	*35%*	*13%*

The two items were summed to form a scale at the individual, team and organisational levels.

In terms of the political utilisation of research evidence at the individual level, 54% of the variance is explained in item 1 and 45% in item 2. At the team level, the latent variable explains 55% of the variance in item 1, and 39% of the variance in item 2. Finally, at the organisational level, item 1 explains 64% of the variance in item 1 and 41% of the variance in item 2. It is clear that the items are not normally distributed, and this again highlights the need to employ bootstrapping when testing the full model. (It is not possible to employ bootstrapping when testing much smaller models such as this, with only two indicators).

5.2.4 *Adoption of an evidence-based approach*

Respondents were asked to what extent an evidence-based approach (EBA) had been adopted by themselves, by their team, and by their organisation. As expected, there is, a strong, positive, relationship between individual, team and organisational level adoption of an EBA. This construct was measured by only one item at each level of analysis, which left the interpretation of what constitutes an 'evidence-based approach' down to the individual respondents.

Table 5.7 *Adoption of an evidence-based approach*

Adopted by:	To a great extent	To a considerable extent	To a moderate extent	To a limited extent	To a very limited extent	Not At all
Self	8%	21%	37%	23%	9%	3%
Team	7%	26%	38%	17%	10%	3%
Organisation	7%	24%	41%	21%	7%	2%

5.3 The predictor variables

5.3.1 Attitude to research.

This scale was made up of the following items:

Table 5.8 *Attitude to research*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. Research is not relevant to my real day to day work	2%	9%	13%	53%	23%
2. Mine should be a research-based profession	11%	27%	27%	29%	6%
3. I am too busy delivering my objectives to spend time reading research	3%	29%	22%	39%	8%
4. Research often leads to real practical advances in the work of healthcare managers	13%	56%	22%	8%	1%
5. Research expertise is of value to healthcare managers	18%	68%	10%	4%	1%
6. Research expertise should not be taken into account in promotion decisions	2%	15%	33%	43%	8%
7. Research is only relevant to healthcare management education, not to practice	0	2%	12%	68%	18%

Factor analysis suggests that the scale is not performing as expected. We obtain a poor-fitting model with relatively low parameter weights:

Table 5.9 *Factor analysis – Attitude to research*

Structure Matrix

	Factor	
	1	2
(RESEARCH1)	.626	-.325
(RESEARCH5)	.619	
(RESEARCH7)	.492	
(RESEARCH6)	.457	
(RESEARCH2)	.425	-.361
(RESEARCH4)		-.845
(RESEARCH3)	.404	-.603

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalisation.

When the measurement model is tested in SEM, it confirms this finding. The model is a poor fit:

Chi-square = 104.066

Degrees of freedom = 14

Probability level = 0.000

RMSEA .10

Hoelter 92

This is very disappointing as it is a relatively well-used scale in the literature.
I attempted to identify those items which would best represent the scale, and wanted to include items which would indicate the extent to which people have found research relevant and have seen improvements generated as a result of this activity. I also wanted to include an item which indicated that people believed they should be rewarded for undertaking this activity, and were willing to expend the necessary effort.

The retained items re-tested in an SEM model were as follows:

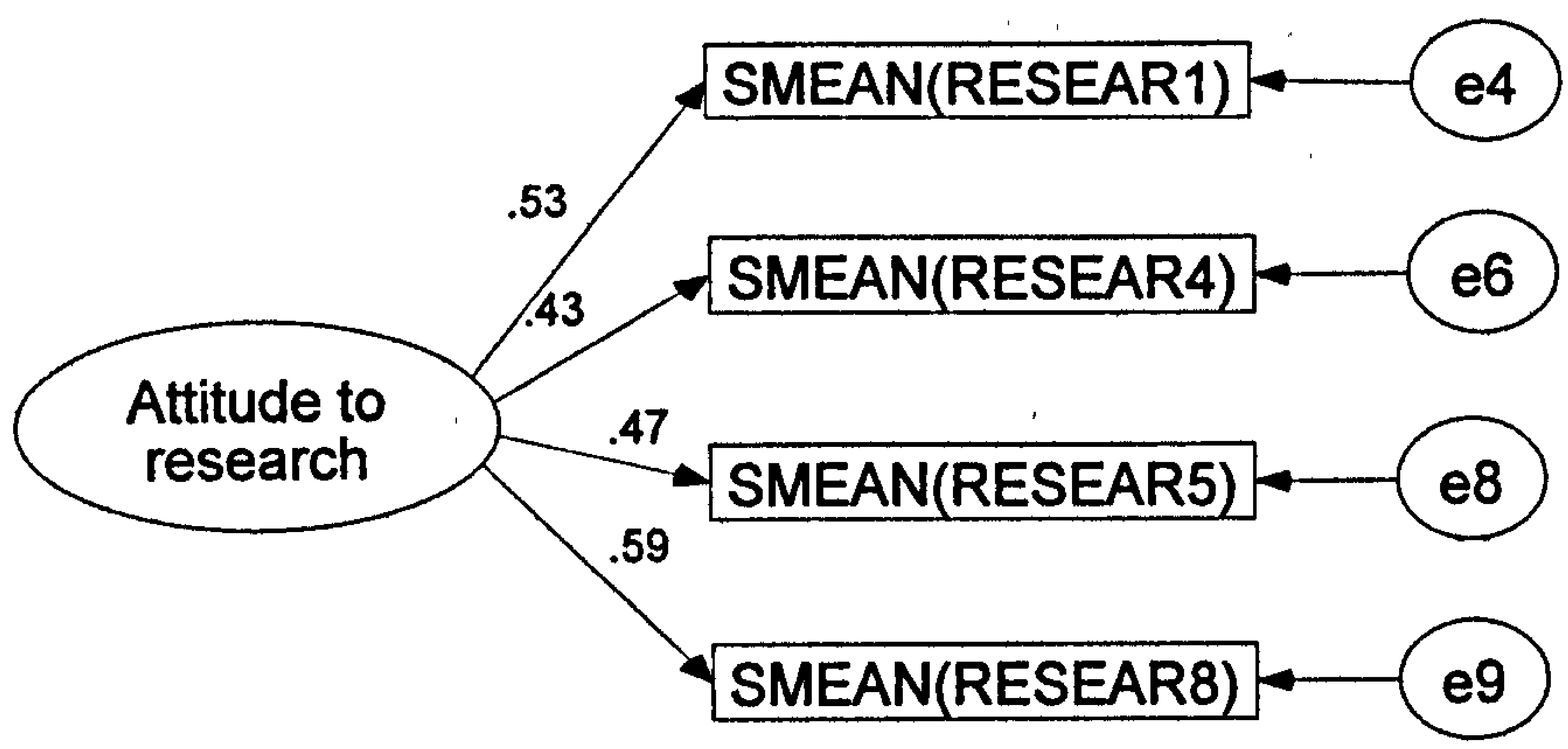
-Research is relevant to my real day-to-day work

-I am too busy delivering my objectives to spend time reading research (reversed)

-Research often leads to real practical advances in the work of healthcare managers

-Research expertise should not be taken into account in promotion decisions for healthcare managers (reversed)

Figure 5.5 *Amos output - Attitude to research*



Chi-square = 0.784

Degrees of freedom = 2

Probability level = 0.676

IFI 1.0

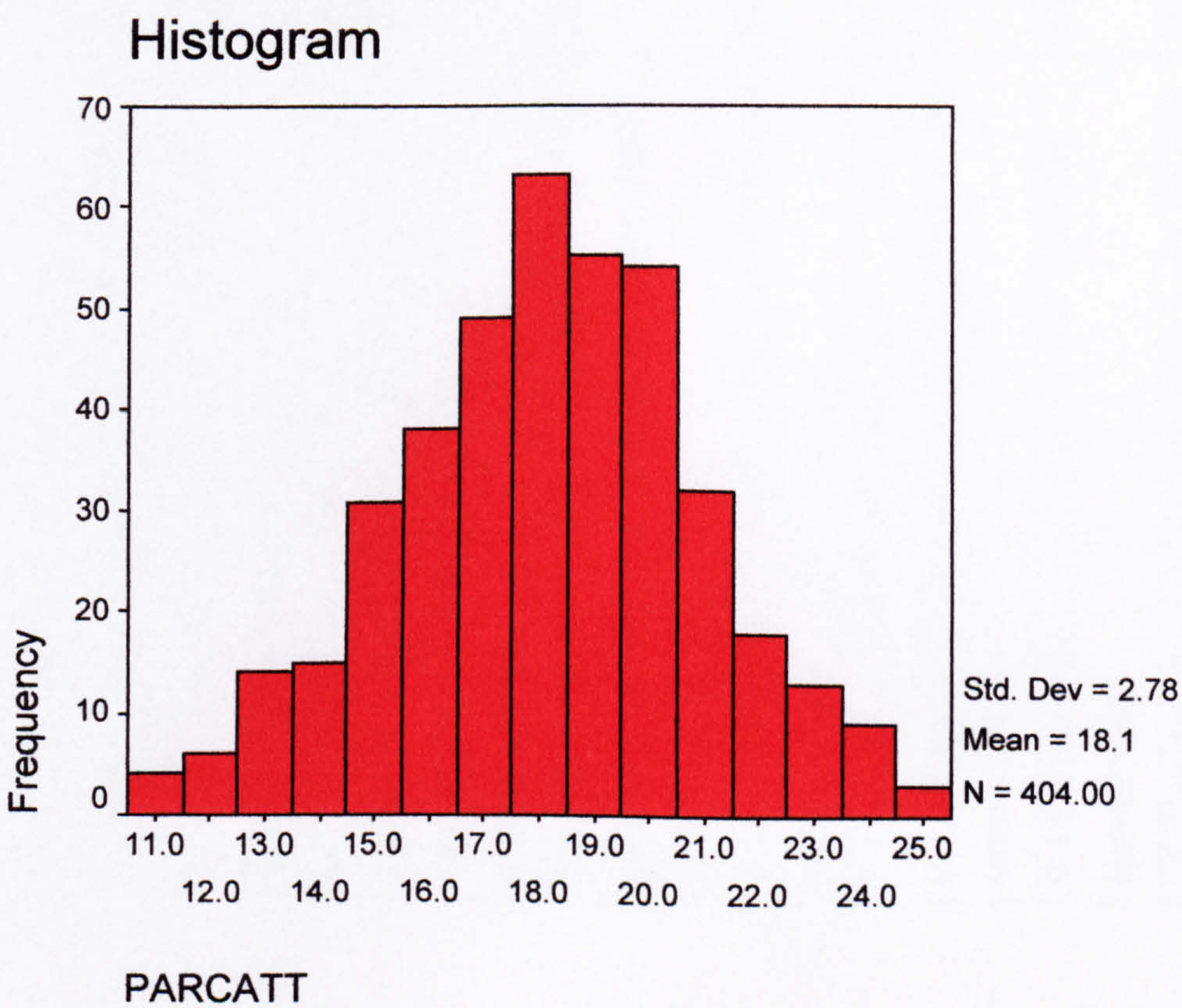
RMSEA .00

Hoelter 1179

The reduced model was well-fitting for all of the groups, although the regression weights are low, giving some cause for concern. In addition, it will not be possible to compare those individuals who have undertaken CASP training with those who have not, on this particular variable; two of the factor loadings show significant differences between the two groups. With this scale, we are certainly not dealing with a uni-dimensional construct, as the research literature would suggest. As mentioned earlier, this is frequently the case when one tests scales using the more stringent SEM technique. This is a particularly disappointing result however; in the case of some items the latent variable explains only 16% of its variance.

Whilst the individual items are not normally distributed, the item parcel is:

Figure 5.6 *Attitude to research - distribution*



The Bollen-Stine Bootstrap:

Testing the null hypothesis that the model is correct, $P = 0.691$; indicating the hypothesised model is well-fitting.

5. 3.2 <u>Need for cognition</u>

The items included in the survey were as follows:

Table 5.10 Need for cognition

	Extremely uncharacteristic	Somewhat uncharacteristic	Uncertain	Somewhat characteristic	Extremely characteristic
1. I would prefer complex to simple problem solving	3%	11%	12%	52%	22%
2. I like to have the responsibility of handling a situation that requires a lot of thinking	0	6%	7%	64%	23%
3. Thinking is not my idea of fun	38%	46%	7%	8%	1%
4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities	41%	45%	4%	9%	2%
5. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something	38%	46%	7%	8%	2%
6. I find satisfaction in deliberating hard and for long hours	5%	29%	29%	32%	6%
7. I only think as hard as I have to	1%	29%	15%	39%	15%
8. I prefer to think about small, daily projects to long terms ones	23%	55%	9%	12%	1%
9. I like tasks that require little thought once I've learned them	28%	47%	9%	14%	2%
10. The idea of relying on thought to make my way to the top appeals to me	3%	13%	27%	44%	13%

11. I really enjoy a task that involves coming up with new solutions to problems	2%	7%	3%	51%	38%
12. Learning new ways to think doesn't excite me very much	34%	47%	7%	10%	2%
13. I prefer my life to be filled with puzzles that I must solve	6%	39%	35%	19%	1%
14. The notion of thinking abstractly is appealing to me	4%	13%	17%	51%	16%
15. I would prefer a task that is intellectual, difficult and important to one that does not require much thought	13%	42%	27%	18%	1%
16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort	12%	59%	11%	15%	3%
17. It's enough for me that something gets the job done, I don't care how or why it works	21%	49%	13%	15%	2%
18. I usually end up deliberating about issues even when they do not affect me personally	5%	22%	17%	47%	8%

Again, factor analysis suggests that the scale does not perform as expected:

Table 5.11 *Factor analysis – Need for cognition*

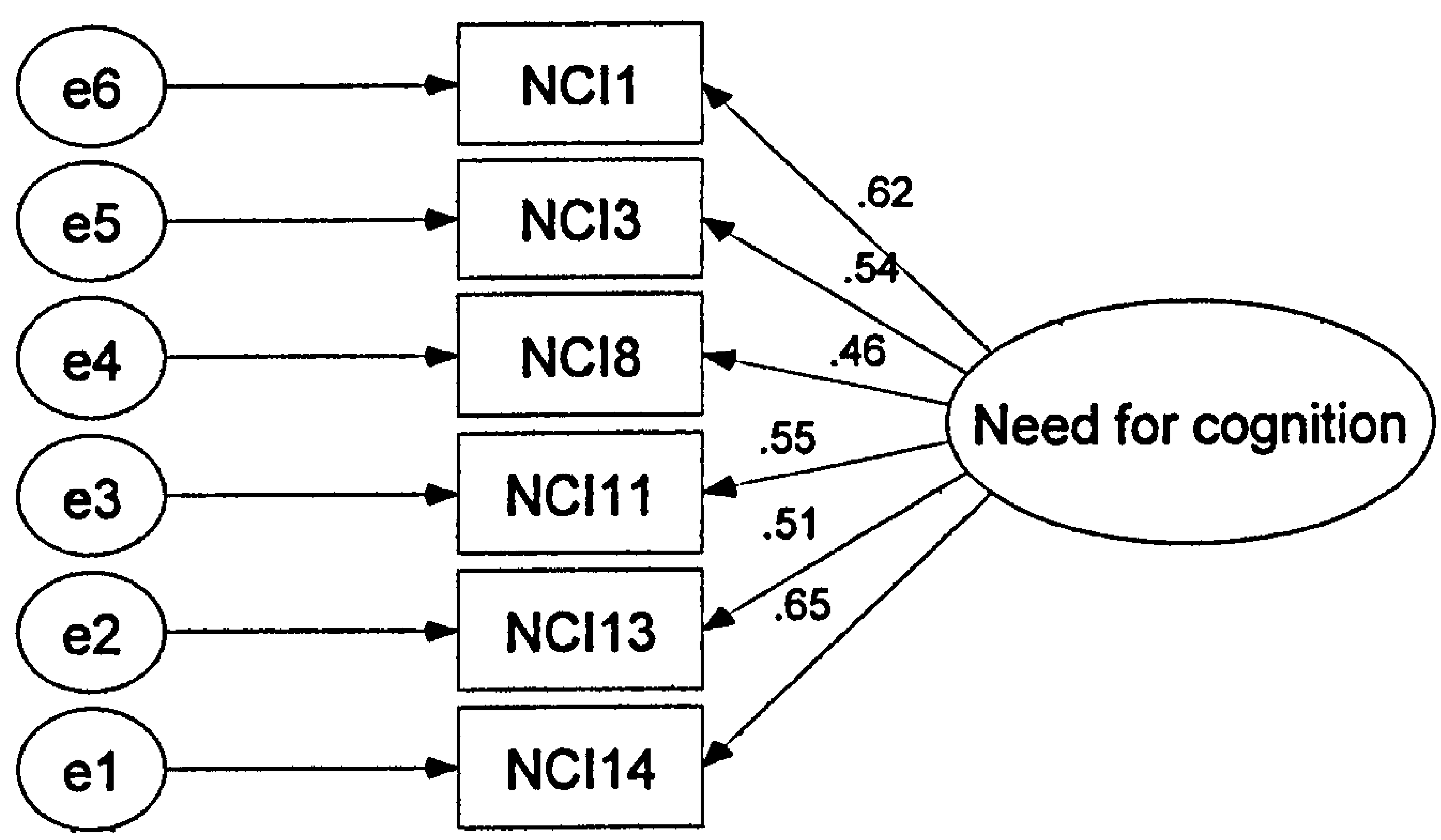
Structure Matrix

	Factor			
	1	2	3	4
(NCI3)	.643			.507
(NCI4)	.634			.372
(NCI5)	.623			.315
(NCI2)	.612	.425		.534
(NCI8)	.588			.345
(NCI9)	.584			.361
(NCI1)	.542	.393		.509
(NCI16)	.428			.368
(NCI7)	.399	.306		
(NCI13)	.328	.520		.369
(NCI15)	.381	.506		.320
(NCI6)		.496		
(NCI10)	.369	.473		.436
(NCI18)		.368		
(NCI17)	.317		.755	
(NCI11)	.423			.745
(NCI12)	.438			.647
(NCI14)	.414	.483		.504

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalisation.

Factor analysis extracted four components. These did not correspond to the three sub-factors identified by previous research in this area. The only sub factor that performed as expected was that related to 'cognitive complexity'. It was decided to include the items related to this sub factor into the structural equation model.

Figure 5.7 Amos output Need for cognition(complexity)



Chi-square = 19.336

Degrees of freedom = 9

Probability level = 0.022

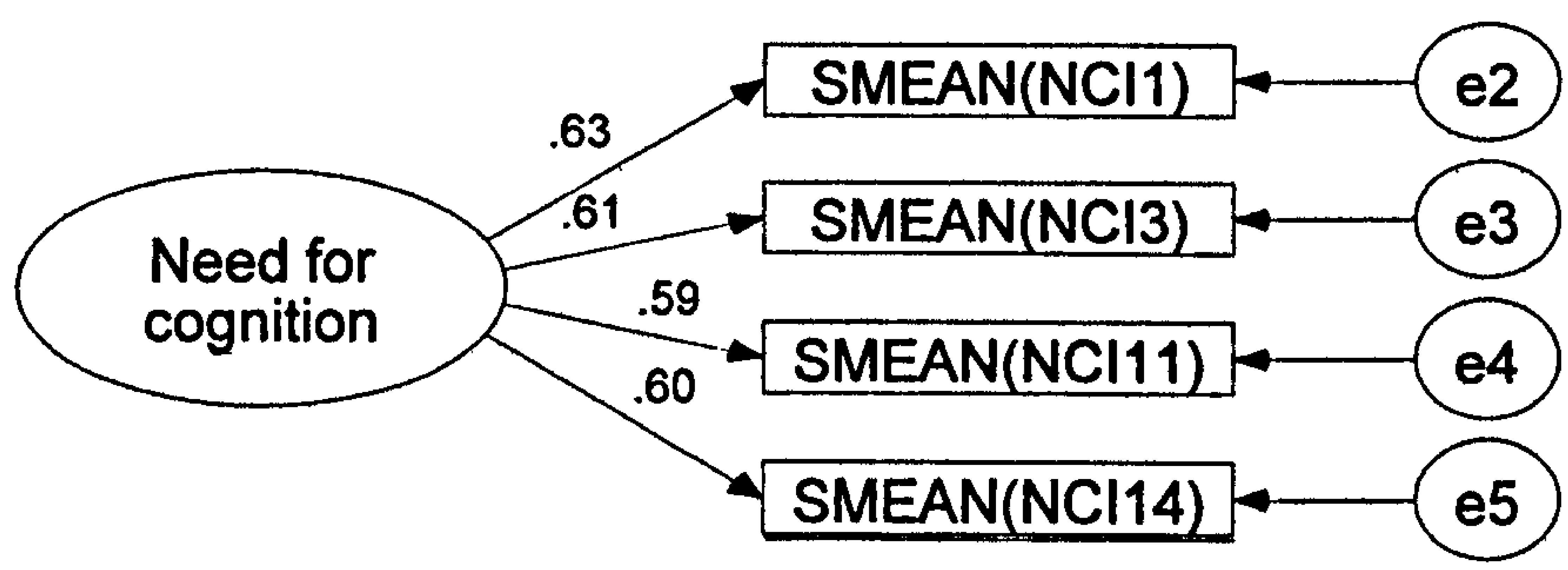
IFI .99

RMSEA .019

Hoelter 353

Each of the items appeared, from a conceptual perspective, to represent the construct equally well. In order to reduce the number of items, it was therefore decided to include those with the highest loadings onto the variable of interest, and the model was re-tested:

Figure 5.8 *Revised Amos output – Need for cognition (complexity)*



Chi-square = 0.879

Degrees of freedom = 2

Probability level = 0.645

GFI .99 IFI 1.0

RMSEA .00

Hoelter 2749

The items included were as follows:

I would prefer complex to simple problem solving

Thinking is not my idea of fun

I really enjoy a task that involves coming up with new solutions to problems

The notion of thinking abstractly is appealing to me

It is important to remember that we are now dealing with one sub factor of *need for cognition*; i.e. *need for complexity*, when we consider this construct in the full model.

Again, the items are not normally distributed.

The Bollen-Stine Bootstrap:

Testing the null hypothesis that the model is correct, P = 0.756; indicating the hypothesised model is well fitting.

5.3.3 Aspirations

The following items were included in the survey:

Table 5.12 *Aspirations*

	Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly disagree*
1. My aspirations are high in regard to professional recognition and achievement	*30%*	*48%*	*16%*	*6%*	*1%*
2. I do not wish to advance to a position of more responsibility	*1%*	*18%*	*23%*	*40%*	*19%*
3. I would like to be in a position of greater influence in the organisation	*21%*	*43%*	*18%*	*16%*	*2%*
4. For me the hassles of being in a higher position would outweigh the benefits	*5%*	*19%*	*20%*	*40%*	*15%*
5. I am concerned that others in the organisation should recognise my knowledge and expertise	*12%*	*50%*	*26%*	*12%*	*0*

When subjected to factor analysis, the model proved to be a poor fit, with two factors being extracted:

Table 5.13 *Factor analysis - Aspirations*

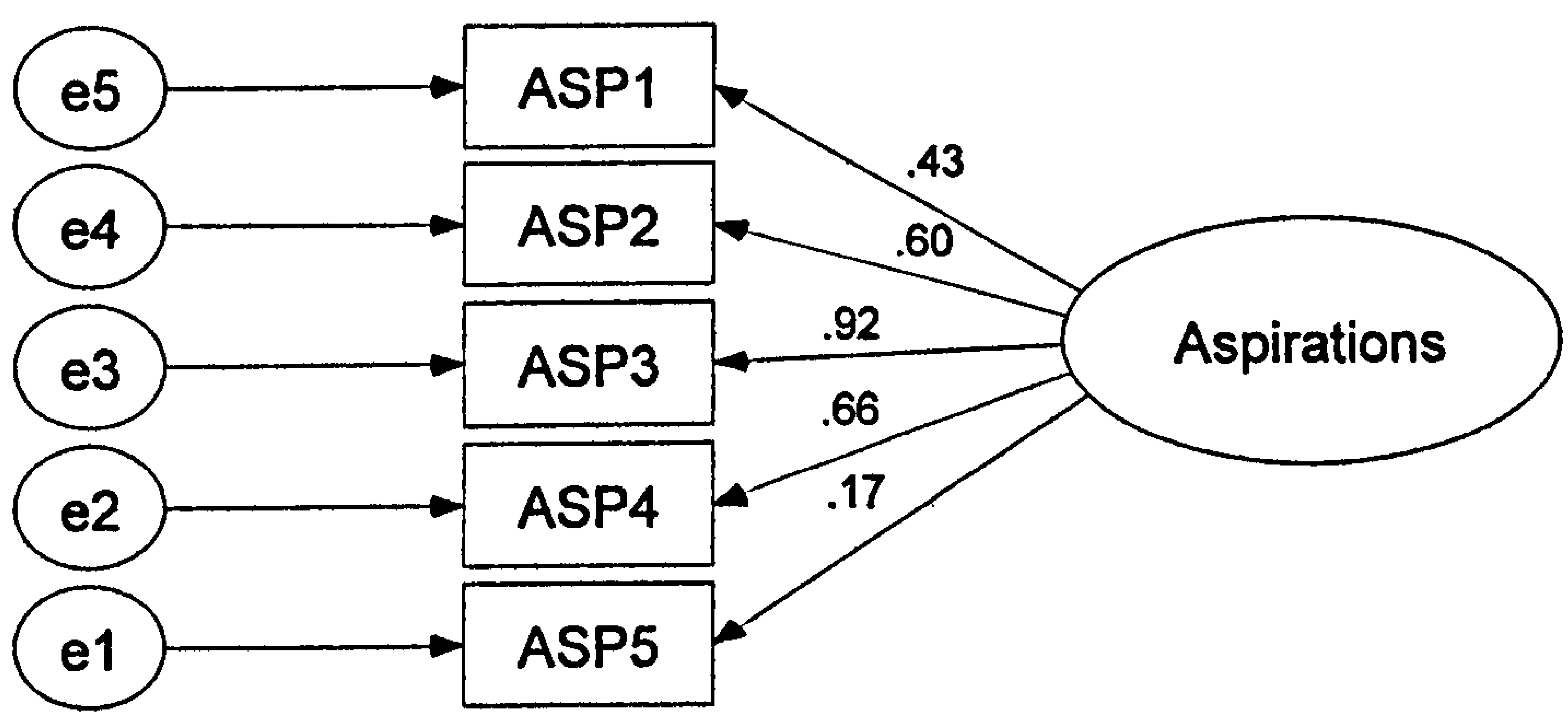
Structure Matrix

	Factor	
	1	2
(ASP3)	.821	.421
(ASP4)	.778	
(ASP2)	.539	.704
(ASP5)		.483
(ASP1)	.407	.413

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalisation.

This was confirmed when the measurement model was tested in the SEM programme:

Figure 5.9 *Amos output Aspirations*



Chi-square = 62.279

Degrees of freedom = 5

Probability level = 0.000

RMSEA .13

Hoelter 85

It was not possible to form a well-fitting scale with these items, and it was therefore only possible to consider the items separately. I took the decision to use just one item which best represented the variable of interest, including as it does, both professional recognition, and also material gain:

My aspirations are high in regard to professional recognition and achievement

5.3.4 <u>Experience</u>

This was just a single item that asked respondents the number of years they have worked in their present role:

4.4% had been in that work area for up to 1 year

13.9% had been in that work area for up to 3 years

25% had been in that work area for up to 5 years

52.3% had been in that work area for up to 10 year

68.6% had been in that work area for up to 15 years

5.3.5 <u>Education level</u>

Respondents were asked to indicate the educational qualifications they had attained:

Secondary Education

National certificate/diploma

Higher National diploma

N/SVQ 1-3

N/SVQ 4-5

Degree

Postgraduate degree/diploma

Masters degree

Doctorate

For the purposes of analysis, the scores for all vocational qualifications were combined. The categories employed were as follows:

(% = people where this was the highest qualification level achieved)

Secondary education	4%
Vocational qualifications	17%
Degree	39%
Postgraduate degree	37%
Doctorate	3%

5.3.6 Critical Appraisal Skills

Respondents were asked to rate their critical appraisal skills with respect to the following items:

Table 5.14 Critical appraisal skills

ITEM	Excellent	Good	Fair	Poor	No awareness
1. Assessing study design	2%	24%	43%	20%	11%
2. Evaluating bias	3%	30%	40%	20%	7%
3. Evaluating adequacy of sample size	3%	30%	38%	22%	7%
4. Evaluating statistical tests	2%	17%	39%	35%	7%
5. Assessing generalisability of findings	5%	38%	35%	16%	7%
6. Literature searching	10%	38%	31%	16%	5%
7. Research methods (quantitative and qualitative)	5%	34%	34%	21%	6%
8. Assessing the general worth of a research article	6%	40%	37%	12%	6%

Factor analysis was undertaken and the results were as follows:

Table 5.15 *Factor analysis – Critical appraisal skills*

Factor Matrix

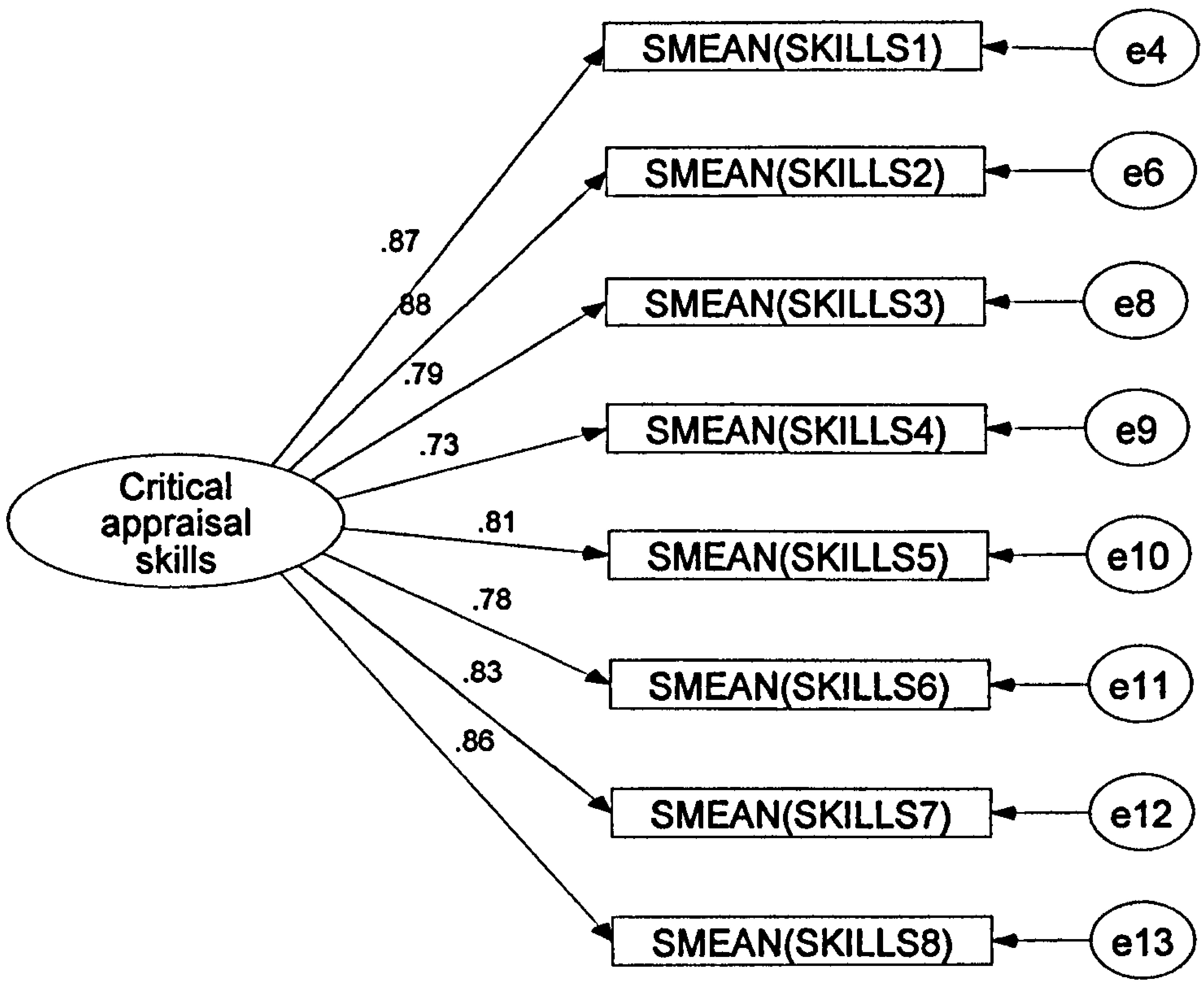
	Factor
	1
(SKILLS2)	.878
(SKILLS1)	.864
(SKILLS8)	.856
(SKILLS7)	.833
(SKILLS5)	.809
(SKILLS3)	.805
(SKILLS6)	.776
(SKILLS4)	.735

Extraction Method: Principal Axis Factoring.
a 1 factors extracted. 4 iterations required.

The results suggest that we are dealing with one construct (critical appraisal skills), all with high regression weights.

Once again, however, when the measurement model was tested it was found to be a poor fit:

Figure 5.10 *Amos output - Critical appraisal skills*



Chi-square = 175.237

Degrees of freedom = 20

Probability level = 0.000

RMSEA .12

Hoelter 73

As discussed earlier, one cannot simply sum the items to form a parcel, as this would disguise the problems inherent in the measurement model. In order to reduce the number of parameters in the model, and ensure that it was well-fitting prior to item parcelling, five items were chosen. The regression weights for all of the items were good, and so the items were chosen which I felt would best represent this construct. The revised model contains the following items:

Assessing study design

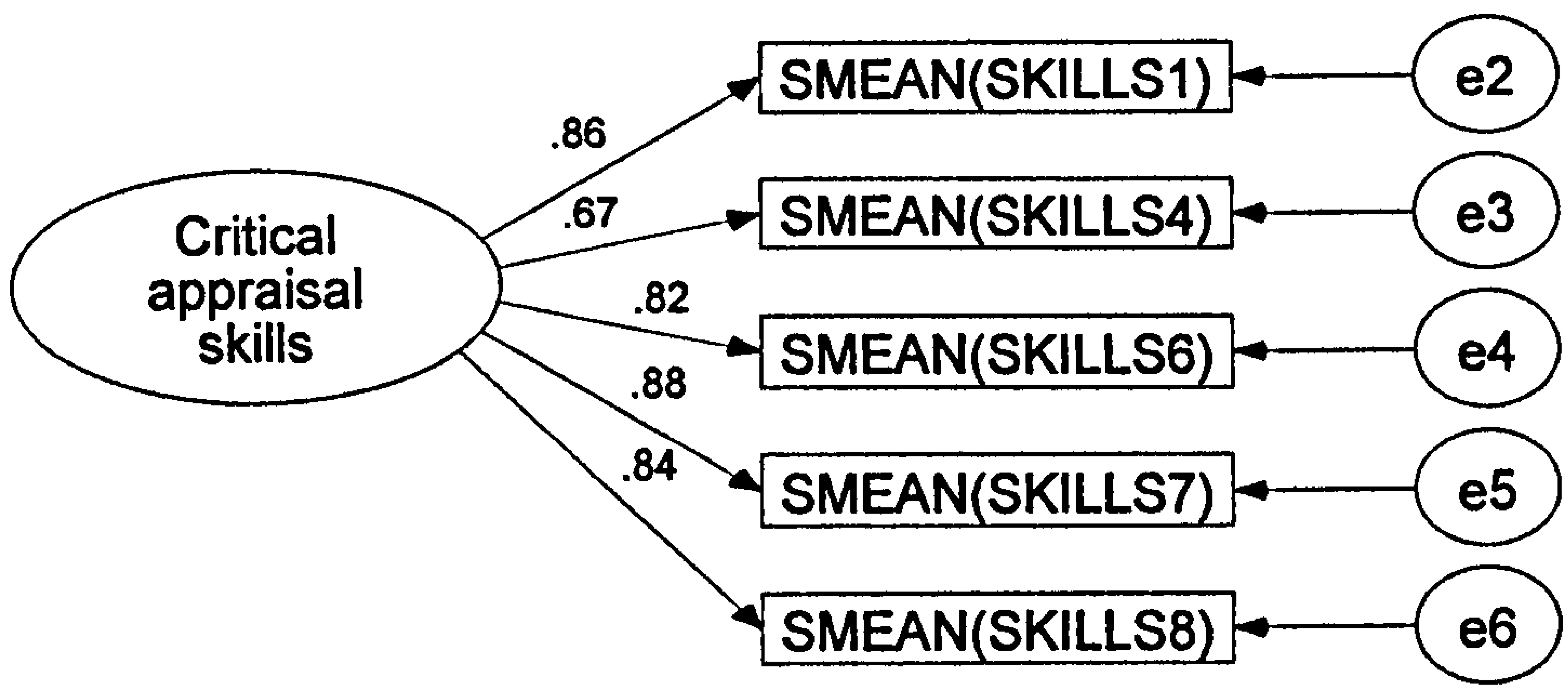
Evaluating statistical tests

Literature searching

Research methods (quantitative and qualitative)

Assessing the general worth of a research article

Figure 5.11 Revised Amos output - Critical appraisal skills



Chi-square = 8.901

Degrees of freedom = 5

Probability level = 0.113

GFI .99 IFI .99

RMSEA .00

Hoelter 502

The Bollen-Stine Bootstrap:

Testing the null hypothesis that the model is correct, P = 0.611; indicating the hypothesised model is well fitting.

5.3.7 Perceived skill level

Respondents were asked whether or not they believed they had the skills necessary to appraise research evidence if they felt it was worth their while.

Table 5.16 *Perceived skill level*

I have the skills needed to appraise research evidence, If I felt it was worth my while.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	8%	41%	27%	20%	3%

5.3.8 Team and organisational utilisation of research evidence

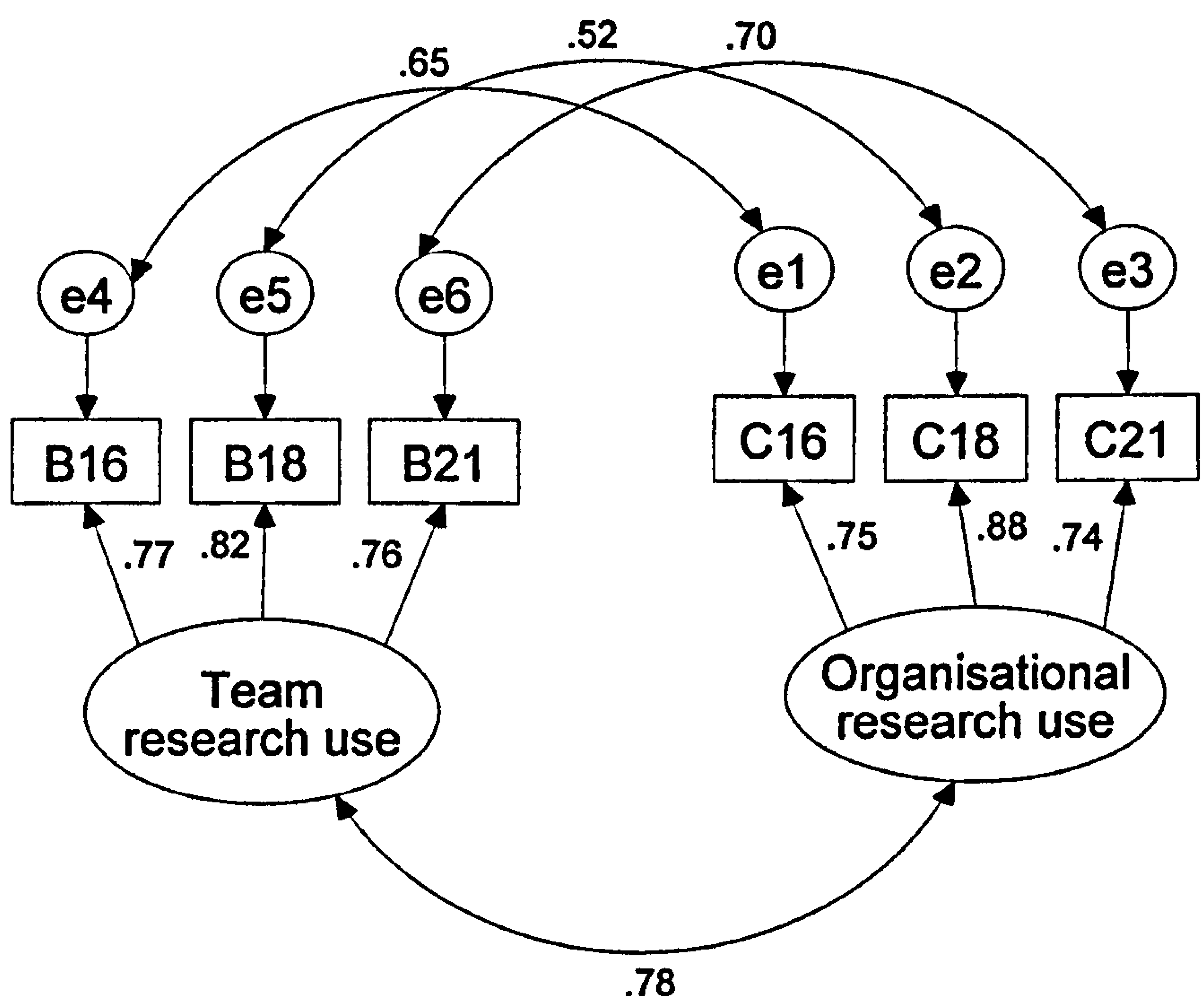
For the sake of consistency, the same items were included as those that formed the scale 'individual utilisation of research evidence.'

B16/C16 Research evidence is translated into significant, practical action in the workplace (within the team/organisation)

B18/C18 Research evidence is used to keep one's professional/managerial knowledge base updated

B21/C21 Research evidence is used to gain a better understanding of work related issues

Figure 5.12 *Amos output - Team and organisational utilisation of research evidence*



Chi-square = 11.007

Degrees of freedom = 5

Probability level = 0.051

GFI .99 IFI .99

RMSEA .055

Hoelter 406

Note that the disturbance (or error) terms of the same questions are allowed to correlate. Each question was asked with respect to both the team and the organisation as a whole, so it is to be expected that the latent variables (team and organisational utilisation of research evidence) would not explain common variance accounted for by asking the same question at both the team and organisational level. This is the unexplained variance that is being captured in the disturbance terms, and so it is unsurprising that there will be a relationship between those terms.

As one might expect, there is also a strong relationship between the extent to which the team utilises research evidence, and the utilisation of research evidence by the organisation. In fact, when exploratory factor analysis is employed, only one factor is extracted.

Table 5.17 *Factor analysis:*

Team and organisational utilisation of research evidence.

Factor Matrix

	Factor
	1
SMEAN(C18)	.805
SMEAN(B21)	.777
SMEAN(C21)	.774
SMEAN(B18)	.755
SMEAN(B16)	.730
SMEAN(C16)	.712

Extraction Method: Principal Axis Factoring.
a 1 factors extracted. 5 iterations required.

As with the majority of measures, there were no significant differences between the groups to be compared. However, there are concerns about the distribution of the individual items. It is apparent that, whilst the Bollen-Stine scores confirm that the individual measurement models are well fitting, in any testing of the full model it will be critical to ensure that this test is employed to ensure that the standard errors (which one would expect to be higher), are taken into account in considering both model fit and any group differences.

5.3.9 Encouraged/rewarded

Two questions make up the 'encouraged' scale:

1. People are encouraged to use research evidence in their decision making

2. People are encouraged to keep up to date with research evidence

Extrinsic rewards consisted of only one item:

3. People are recognised and rewarded for their awareness and use of research evidence

The factor matrix:

Table 5.18 *Factor analysis – Encouraged/Rewarded*

	Factor
	1
(ENCOURAD1)	.883
(ENCOURAD2)	.877
(REWARDED1)	.549

Extraction Method: Principal Axis Factoring.
a 1 factors extracted. 8 iterations required.

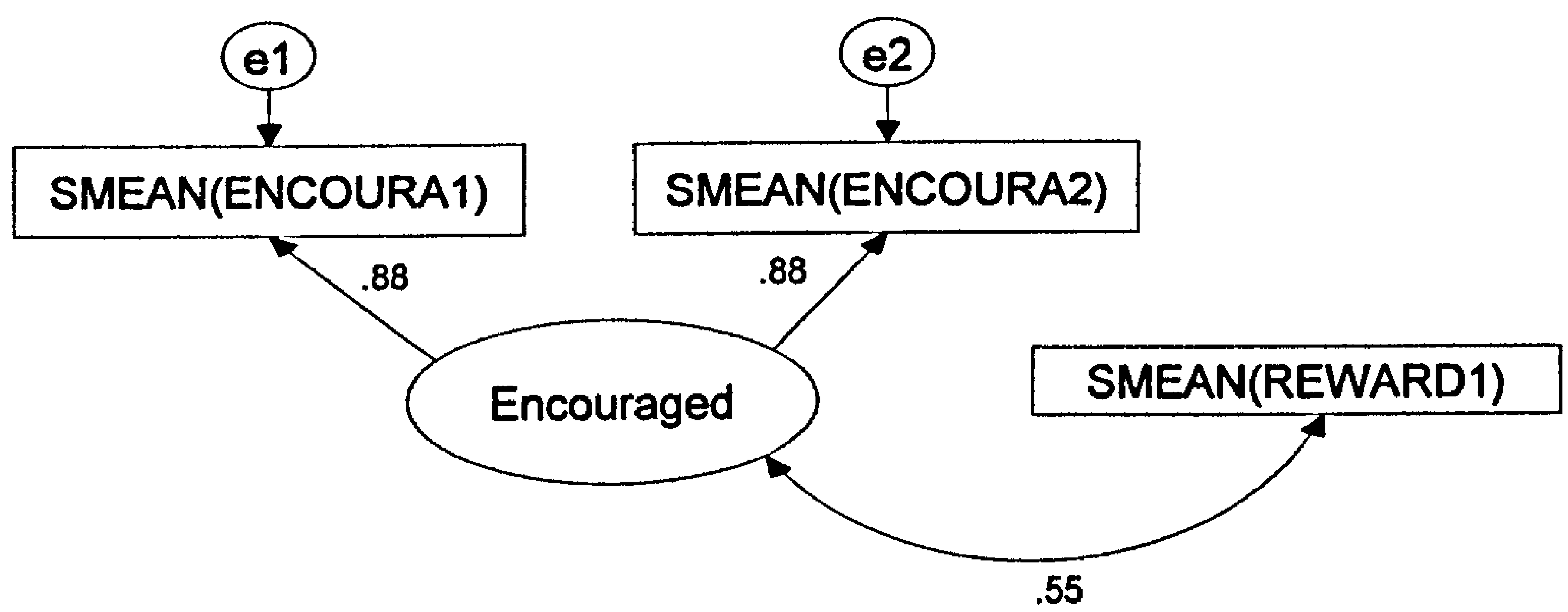
Although factor analysis suggests that we are dealing with one component, in the SEM model, 'encouraged' and 'rewarded' have been kept separate as the theory suggests that extrinsic rewards may have a negative impact on the behaviour in question, whereas verbal encouragement is expected to have a positive impact.

Table 5.19 *Encouraged/Rewarded*

Question	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
People are encouraged to use research evidence in their decision making	*7%*	*52%*	*25%*	*15%*	*1%*
People are encouraged to keep up to date with research evidence	*8%*	*57%*	*19%*	*14%*	*2%*
People are recognised and rewarded for their awareness and use of research evidence	*3%*	*16%*	*44%*	*34%*	*3%*

It is likely that the two constructs, although kept separate in the model for the reasons stated, would still be strongly correlated and indeed this proved to be the case in the measurement model detailed below:

Figure 5.13 *Amos output – Encouraged/Rewarded*



Note that fit measures cannot be computed, as there are no degrees of freedom. The regression weights for the two items related to 'encouraged' appear to be acceptable, and there are no significant differences between the groups considered.

5.3.10 ***Promotion linked to research expertise***

This was measured by only one item:

Table 5.20 *Promotion linked to research expertise*

Research expertise is taken into account in promotion decisions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	7%	32%	32%	27%	3%

5.3.11 ***Managerial influencing style***

8 influencing styles were identified and respondents were asked to rate their level of agreement with the following statements about their line managers' influencing style:

1. Consultation: *'They listen to their concerns and suggestions and are willing to modify their proposals to deal with these.'*
2. Personal appeals: 'They appeal to their colleagues loyalty and friendship.'
3. Ingratiation*: 'They use praise, flattery or are helpful towards them.'*
4. Exchange*: 'They indicate a willingness to reciprocate a favour at a later time, or promise a share of the benefits/recognition…'*
5. Pressure: *'They use demands and threats.'*
6. Inspirational appeals*: 'They appeal to their values, ideals and aspirations.'*
7. Rational persuasion*: 'They use logical arguments and factual evidence to convince their colleagues.'*
8. Legitimising tactics*: 'They point to their authority or right to make the decision, and verify that it is consistent with organisational rules.'*
9. Coalition tactics*: 'They lobby and seek the support of others to back them.'*

Table 5.21 Managerial influencing style

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Consultation	6%	33%	26%	27%	9%
Personal appeals	7%	56%	21%	14%	2%
Ingratiation	6%	46%	24%	21%	3%
Exchange	5%	33%	31%	27%	5%
Pressure	4%	36%	28%	28%	4%
Inspirational appeals	4%	17%	16%	45%	19%
Rational persuasion	12%	57%	14%	14%	2%
Legitimising tactics	5%	51%	26%	15%	3%
Coalition tactics	14%	65%	12%	7%	2%

It was hoped that items 2, 3 and 4 would form a reliable scale representing an influencing style that was 'personality driven' as opposed to being based upon rational decision making style. Items 1 and 7 represented the style of decision making that ought to encourage evidence-based practice.

The factor analysis suggests three sub-factors:

Table 5.22 *Factor analysis - Managerial influencing style*

Factor Matrix

	Factor		
	1	2	3
DECISION 1	.742		
DECISION 5	-.701	.342	
DECISION 7	.606		.348
DECISION 8	-.564		
DECISION 6	.469		
DECISION 2		.657	
DECISION 3		.553	
DECISION 4	.300	.501	
DECISION 9		.333	

Extraction Method: Principal Axis Factoring.
a 3 factors extracted. 17 iterations required.

One could argue that the items related to the first factor suggest a rational, consultative style that is not based on threats and demands, whereas those making up the second factor appear to suggest a personality driven/ingratiating managerial style. However, there is a cross loading from item five onto the second factor, and the regression weights are not encouraging. I made the decision to consider each of the items separately in the full model. I was particularly concerned with understanding the impact of *a threatening and demanding influencing style*, on the behaviours to be modelled.

5.3.12 Perceptions of research use by healthcare managers

The items included were:

1. *In practice, very few healthcare managers use research findings.*
2. *Most healthcare managers are aware of research findings.*
3. *Healthcare managers are too busy to incorporate research findings into day-to-day practice.*

Table 5.23 *Perceptions of research use by healthcare managers*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1.	1%	14%	30%	48%	7%
2.	6%	49%	31%	15%	1%
3.	2%	27%	31%	36%	4%

Factor analysis extracts one component:

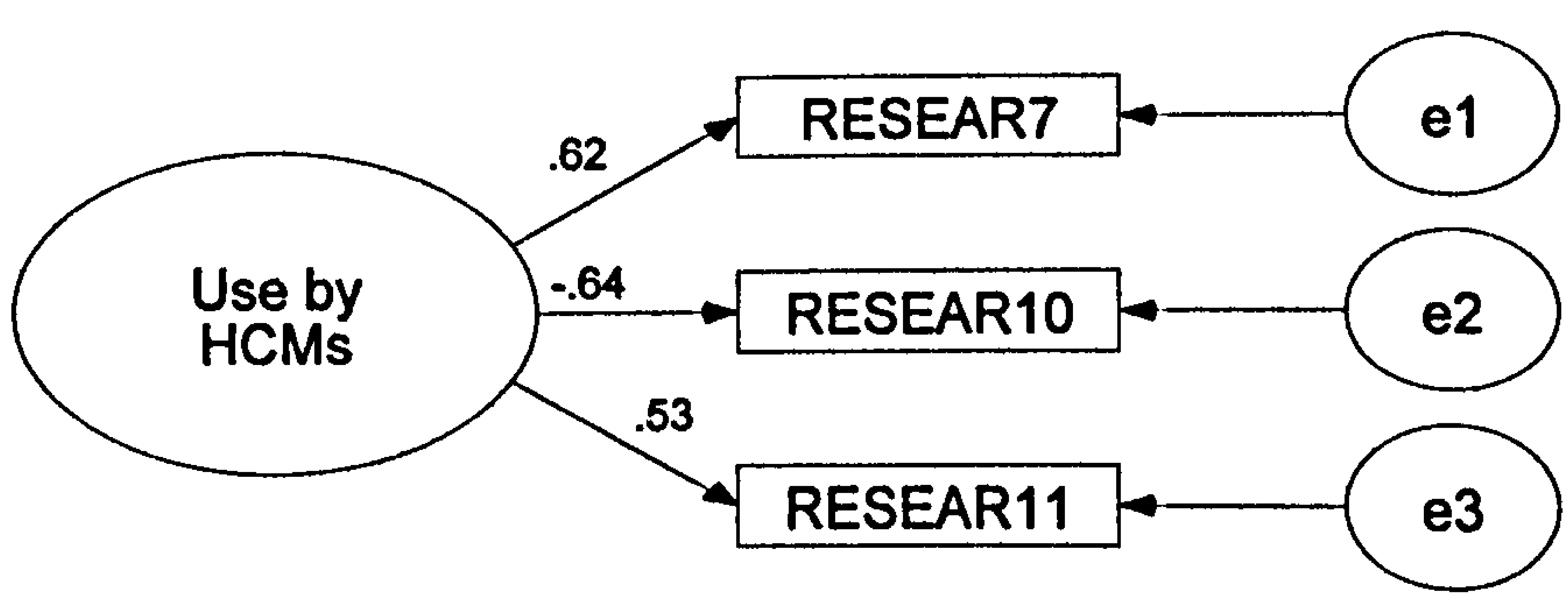
Table 5.24 *Factor analysis - Perceptions of research use by healthcare managers*

Factor Matrix

	Factor
	1
RESEARCH 7	.643
RESEARCH 10	-.690
RESEARCH 11	.566

Extraction Method: Principal Axis Factoring.
a 1 factor extracted. 11 iterations required

Figure 5.14 *Amos output* - Perceptions of research use by healthcare managers



Again, the parameter estimates are lower than one might have hoped, and so I shall separate out the items in the final model to explore whether or not this significantly alters the results.

5.3.13 ***Extrinsic perceived behavioural control - Time access and authority***

This construct was made up of three items:

1. *'If I felt it was worth my while, I could find the time to review research evidence'*
2. *'If I felt it was worth my while, I could locate and access research evidence'*
3. *'I have the authority to use research evidence in my work, if I felt it was worth my while'*

Table 5.25 *Extrinsic perceived behavioural control*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1.	7%	46%	25%	20%	2%
2.	11%	60%	20%	10%	0%
3.	17%	60%	15%	6%	1%

The results are certainly more positive than previous studies have implied, although in common with previous research, 'time' is still regarded as the most difficult resource to access.

Factor analysis suggests that we may indeed be dealing with one factor.

Table 5.26 *Factor analysis - Extrinsic perceived behavioural control*

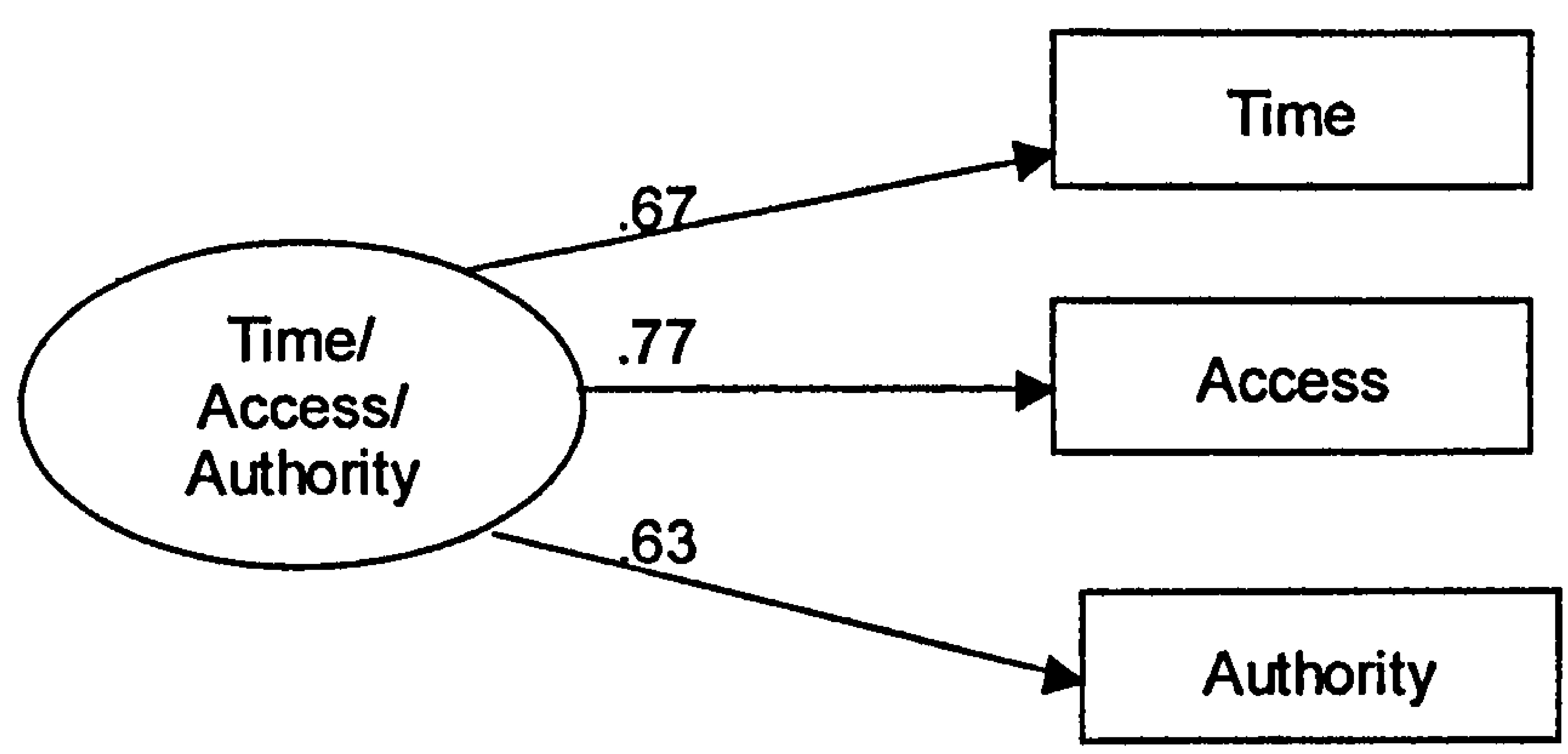
Factor Matrix

	Factor
	1
ACCESS	.862
TIME	.700
AUTHORITY	.670

Extraction Method: Principal Axis Factoring.

The model was tested employing confirmatory factor analysis; although rather lower factor loadings than are ideal were obtained, they appear acceptable.

Figure 5.15 *Amos output* - Extrinsic perceived behavioural control



The model was not comparable between those groups who had undertaken CASP training and those who had not; when these groups are compared it will be necessary to separate out the above items, although we are then also facing problems concerned with the non normal distribution of these items.

5.3.14 *Grade*

The grades were those used by the Institute of Healthcare Managers on their application form for membership and ranged from non-manager to director.

Non-Manager	23%
Junior Manager	42%
Middle Manager	27%
Senior Manager	5%
Director (board member)	4%

As discussed earlier, grade would also be considered as a moderator variable with Junior and Non Managers identified as being in "lower-graded' posts and Middle Managers and above as 'higher grades.'

5.3.15 *Decision type*

This construct was made up of five items. Respondents were asked to identify the frequency with which the decisions they made in their job were:

1. *'Made within existing policies and guidelines.'*
2. *'Complex, with many factors which must be taken into account.'*
3. *'Dependent upon the perspectives and buy in of many stakeholders.'*
4. *'Routine, only rarely does something new come up.'*
5. *'High risk.'*

Table 5.27 *Decision type*

How often are the decisions that you must make in your job...?

	Always	Frequently	Occasionally	Rarely	Never
Made within existing policies and guidelines	11%	67%	18%	4%	0%
Complex, with many factors which must be taken into account	13%	72%	13%	21%	0%
Dependent upon the 'buy-in' of many stakeholders	17%	50%	22%	8%	4%
High risk	2%	14%	28%	50%	7%
Routine, only rarely does something new come up	3%	26%	50%	18%	3%

The intention was that the construct would measure the extent to which the respondents' decision making was largely tactical or strategic. The model, however, was a poor fit when I included the item, '*made within existing policies and guidelines.*' Even those managers who identified their decision making as largely strategic claimed that their decisions were made within existing policies and guidelines.

Table 5.28 *Factor analysis – Decision type*

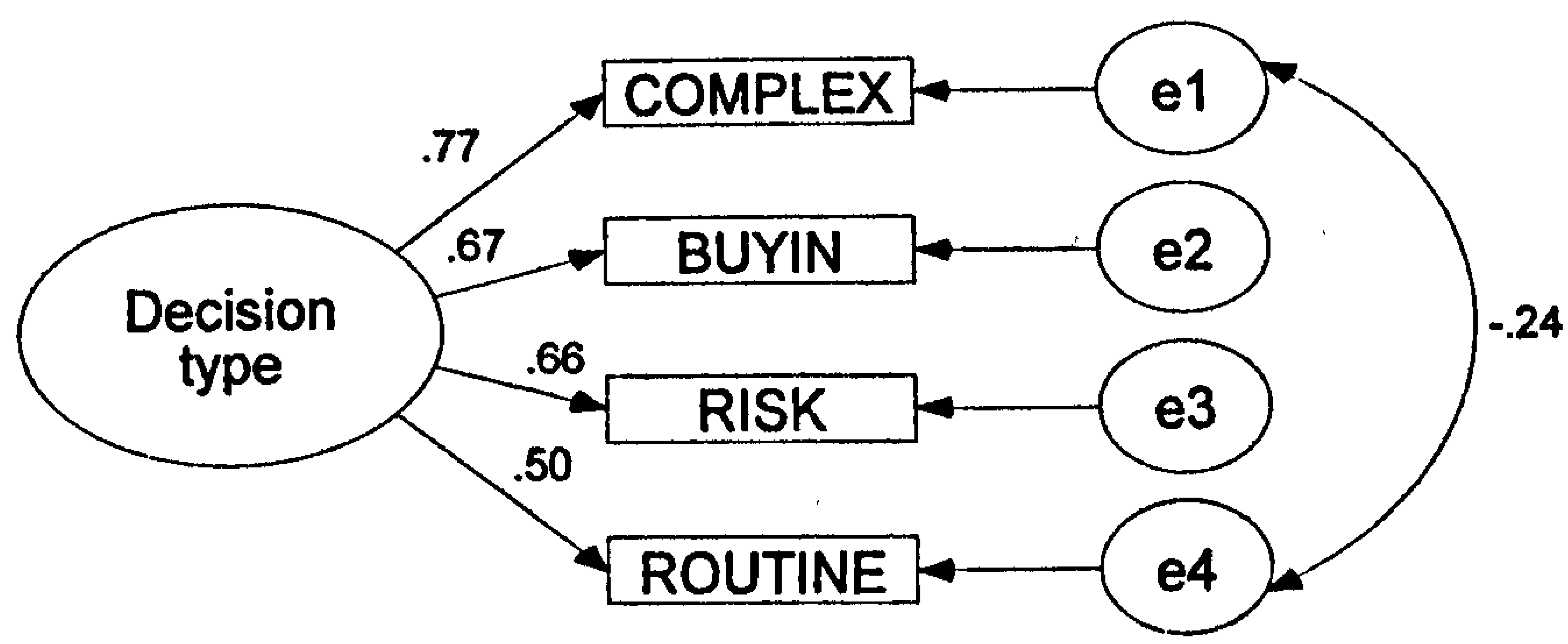
Factor Matrix

	SEM TAG	Factor	
		1	2
Complex, with many factors which must be taken into account	(COMPLEX)	.722	
Dependent upon the perspectives and buy in of many stakeholders	(BUYIN)	.661	
High risk	(RISK)	.646	
Routine, only rarely does something new come up'	(ROUTINE)	.591	
Made within existing policies and guidelines	(EXIST)		.434

Extraction Method: Principal Axis Factoring.
a 2 factors extracted. 18 iterations required.

The item *'Made within existing policies and guidelines'* was deleted and the model was re-tested within AMOS:

Figure 5.16 Amos output – Decision type



Note that the modification index suggests that the disturbance terms for 'complex' and 'routine' decision making ought to be allowed to correlate. As this makes sense theoretically, this change was incorporated into the model.

Chi-square = 0.024
Degrees of freedom = 1
Probability level = 0.878
IFI 1.0
RMSEA .00
Hoelter 6539

It was unclear from the literature whether strategic decision making ought to be modelled as a predictor or outcome variable, and so the analysis will attempt to determine its relationship, if any, with the behaviours to be examined.

5. 3.16 Organisational learning climate

The Organisational Learning Scale (OLS) features 21 questions that together cover the five dimensions. I made minor changes to some of the wording of the items to better reflect the NHS language; specifically, changing 'mission' to 'goals and purpose', and using 'managers and professional staff' instead of 'managers' to reflect the fact that some senior employees may have no staff management responsibilities. The survey items were also reduced from 1-7 responses to 1-5 to ensure consistency across the questionnaire following the pilot.

Respondents were asked to rate their level of agreement with the following statements:-

Page intentionally blank

Table 5.29 *Organisational learning climate*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. There is widespread support and acceptance of our purpose and goals	15%	56%	16%	13%	1%
2. I do not understand how our goals and purpose are to be achieved	1%	8%	10%	58%	23%
3. We have identified values to which we must all conform	10%	56%	21%	10%	2%
4. We have opportunities for self assessment with respect to goal achievement	6%	62%	17%	14%	2%
5. Senior managers and professionals resist change and are afraid of new ideas	3%	15%	15%	49%	18%
6. Senior managers and professionals share a common vision with all staff about what our work should accomplish	3%	36%	25%	32%	4%

7. Managers and professional staff can accept criticism without becoming overly defensive	1%	33%	27%	35%	4%
8. Managers and professional staff provide useful feedback that helps to identify potential problems and opportunities	8%	65%	19%	7%	2%
9. Managers and professionals frequently involve less senior staff in important decisions	6%	54%	18%	21%	2%
10. I can often bring new ideas into the workplace	26%	62%	9%	2%	1%
11. From my experience, people who are new around here are encouraged to question the way things are done	7%	53%	22%	15%	2%
12. Managers and professional staff encourage less senior people to experiment in order to improve work processes	4%	48%	26%	20%	2%
13. Innovative ideas that work are often rewarded	3%	34%	29%	29%	5%
14. In my experience, new ideas from less senior staff are not treated seriously	1%	16%	19%	57%	7%
15. I often have the opportunity to talk to colleagues about successful programmes or work activities to understand why they succeed	6%	48%	21%	23%	2%

16. Failures are seldom constructively discussed here	6%	20%	18%	50%	6%
17. New work processes that may be useful to other parts of the organisation are usually shared	6%	52%	21%	20%	1%
18. We have a system that allows us to learn successful practices from other parts of the organisation	5%	40%	25%	27%	3%
19. Current practice encourages staff to solve problems together before escalating the issue	4%	56%	20%	19%	2%
20. We cannot usually form informal groups to solve organisational problems	2%	18%	16%	55%	9%
21. Most problem-solving groups here feature employees from a variety of functional backgrounds	6%	51%	26%	16%	2%

Although factor analysis extracted four factors (rather than five expected from the literature), it would be difficult to suggest that we are not dealing with only one underlying factor. The first factor explains 29% of the variance, whilst the next three factors extracted explain only a further 9% in total.

Table 5.30 *Factor analysis - Organisational leaming climate*

Factor Matrix

	Factor			
	1	2	3	4
CLIMATE 18	.707		-.329	
CLIMATE 12	.663			
CLIMATE 6	.639			
CLIMATE 17	.621			
CLIMATE 20	.613			
CLIMATE 8	.612			
CLIMATE 9	.556			
CLIMATE 11	.550			
CLIMATE 13	.549			
CLIMATE 7	.536			
CLIMATE 14	.526			
CLIMATE 16	.505			
CLIMATE 5	.502			
CLIMATE 1	.483	.343	.316	
CLIMATE 21	.480			
CLIMATE 15	.479			
CLIMATE 22	.462			
CLIMATE 4	.454			
CLIMATE 2	.453			
CLIMATE 10	.442			.310
CLIMATE 3	.365			

Extraction Method: Principal Axis Factoring.
a 4 factors extracted. 11 iterations required.

Four sub-factors were represented in the model below by their highest loading item:

Leadership, Commitment and Empowerment

'Senior managers and professionals share a common vision with all staff about what our work should accomplish.'

Experimentation

'Managers and professional staff encourage less senior people to experiment in order to improve work processes.'

Transfer of knowledge

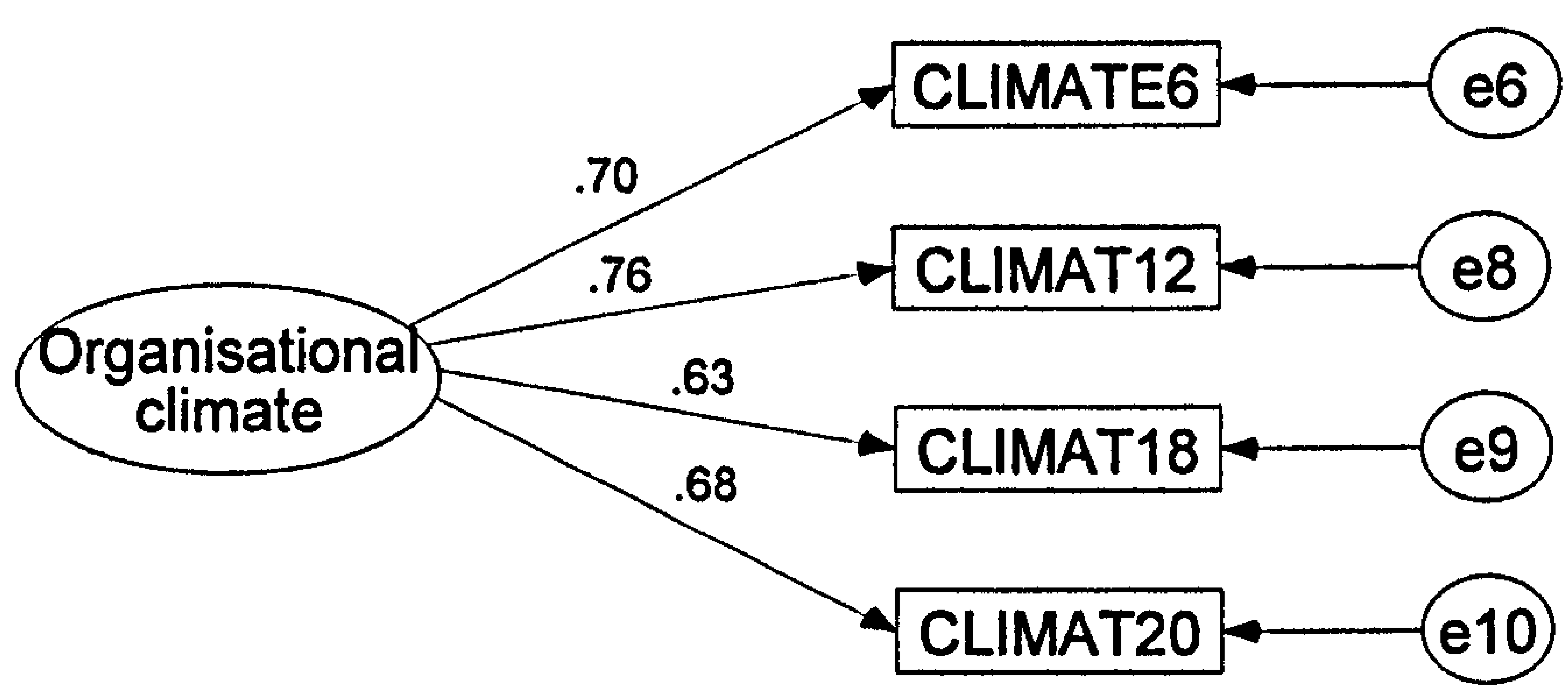
'We have a system that allows us to learn successful practices from other parts of the organisation.'

Teamwork and group problem solving.

'We cannot usually form informal groups to solve organisational problems.'

The loadings of all of the items associated with clarity of purpose and mission were unacceptable and this construct is therefore not represented in the model below:

Figure 5.17 *Amos output - Organisational learning climate*



Chi-square = 3.739

Degrees of freedom = 2

Probability level = 0.154

GFI .99 IFI .979

RMSEA .00

Hoelter 400

The model was then constrained to be equal across groups, and that there were no significant differences in the model between the sub-groups to be compared:

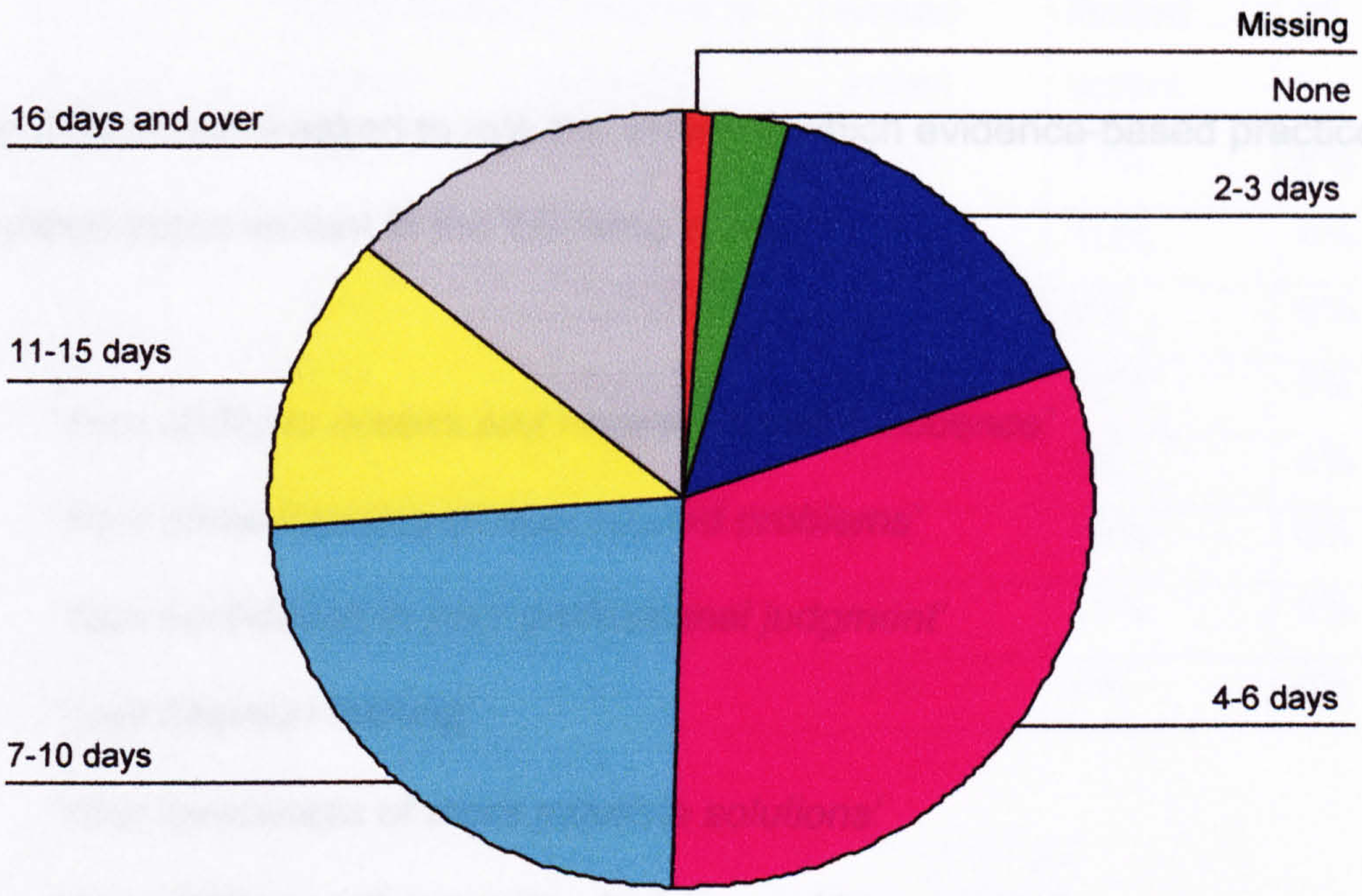
5.3.17 *Clinical/non-clinical managers and practitioners*

40% of respondents described themselves as having a role that involved clinical management, and only 18% described themselves as clinical practitioners. It will, therefore, not be possible to utilise the full hypothesised model when considering the sub-group 'clinical practitioners', as the parameter to sample size ratio would be too low.

5.3.18 *Continuing Professional Development (CPD)*

Respondents were asked to identify how many days they spend on formal and informal development activities in the average year.

Figure 5.18 *Continuing Professional Development (CPD)*



In terms of the group comparisons, those who undertake 6 days of less CPD in the average year are identified as 'Low CPD.' 7 days and above as 'High CPD.'

5.3.19 CASP Training

17% of respondents reported that they had received critical appraisal skills training (n= 71). Again, this is too small a number to consider CASP trained individuals as a sub-group when considering the full model, as the sample size to parameter ratio would be too low.

5.4 Outcome variables

5.4.1 Perceived improvements

Respondents were asked to rate the extent to which evidence-based practice had generated improvement in the following areas:

1. *'Your ability to access and review research evidence'*
2. *'Your understanding of work related problems'*
3. *'Your confidence in your professional judgment'*
4. *'Your decision making'*
5. *'Your awareness of more possible solutions'*
6. *'Your ability to influence the decision making process'*
7. *'Your work performance'*
8. *'Your ability to audit/evaluate interventions'*

Table 5.31 *Perceived improvements*

	To a great extent	To a considerable extent	To a moderate extent	To a limited extent	To a very limited extent	Not at all
1.	7%	19%	34%	21%	11%	8%
2.	6%	29%	36%	15%	10%	4%
3.	6%	32%	32%	16%	9%	6%
4.	6%	30%	32%	16%	10%	5%
5.	9%	36%	30%	14%	8%	4%
6.	6%	27%	30%	22%	10%	6%
7.	6%	25%	34%	20%	11%	5%
8.	7%	27%	33%	17%	8%	8%

Factor analysis would appear to suggest that we are dealing with one factor, although the regression weights are so high there is the suggestion that people are not distinguishing between the items. It could be argued that people have responded on the basis of whether of not they believe evidence-based practice has proven to be 'a good thing' in terms of generating improvements more generally.

Table 5.32 *Factor analysis - Perceived improvements*

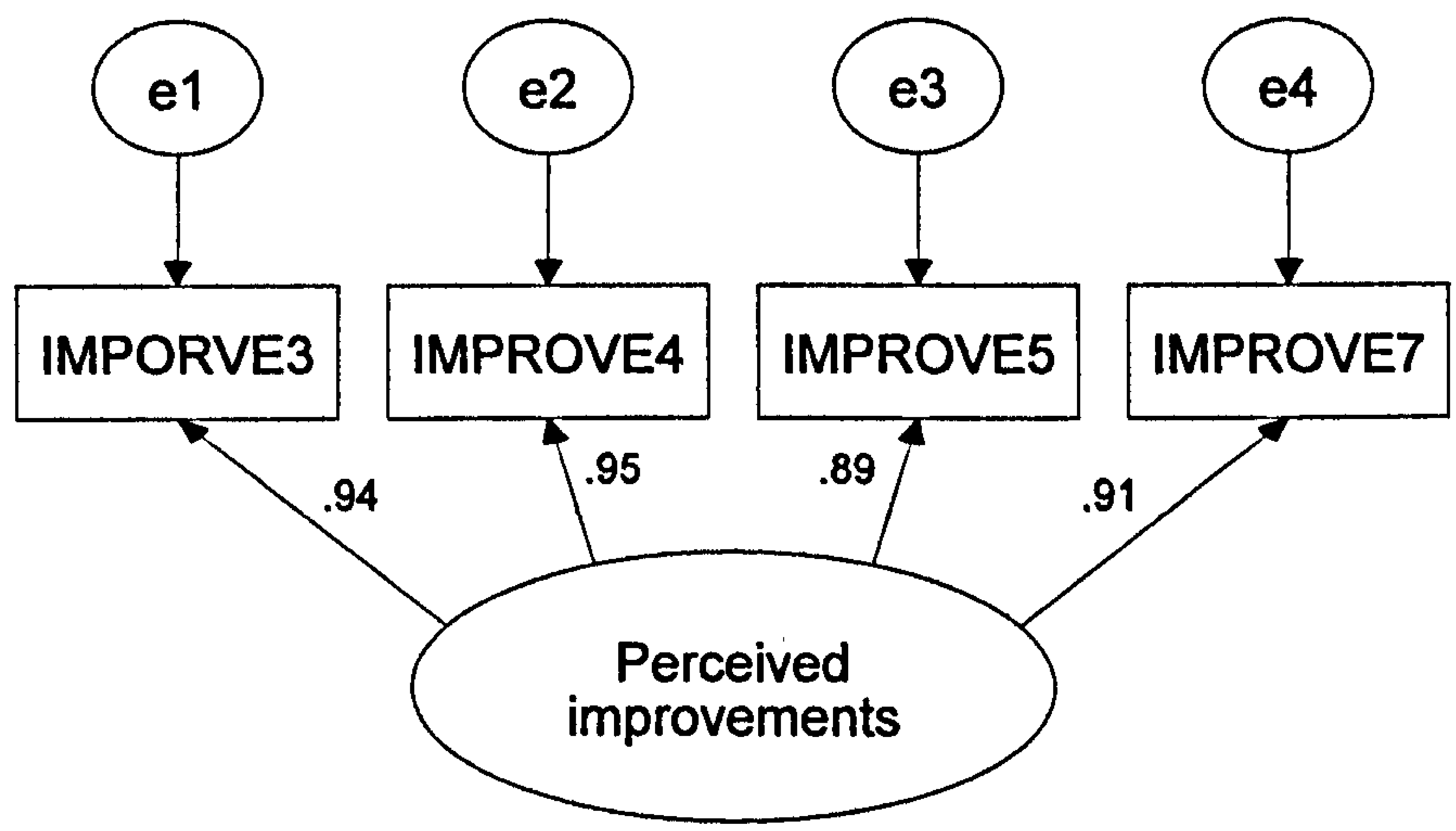
Factor Matrix

	Factor
	1
IMPROVE 4	.946
IMPORVE 3	.938
IMPROVE 7	.916
IMPROVE 5	.914
IMPROVE 2	.902
IMPROVE 8	.885
IMPROVE 6	.877
IMPROVE 1	.809

Extraction Method: Principal Axis Factoring.
a 1 factors extracted. 3 iterations required.

The highest loading items were entered into the SEM model:

Figure 5.19 *Amos output - Perceived improvements*



Chi-square = 1.890

Degrees of freedom = 2

Probability level = 0.389

GFI .99 IFI 1.0

RMSEA .00

Hoelter 1278

5.5 Conclusions

The Bollen-Stine bootstrap p values in the measurement models confirmed that the models to be employed in the analysis are well-fitting, although it was necessary to reduce the number of items in most of the scales in order to obtain this fit. It was disappointing that the scales did not perform better, but this is very common in SEM. Even widely used scales have been found wanting when subject to this more rigorous test of fit. A number of the scales cannot be used as intended, and it will be necessary to use individual items rather than parcelling items which cannot be said, on the basis of the above analysis, to represent a latent variable. Testing measurement models within SEM, prior to testing the hypothesised structural model, prevents the researcher from bundling together items that had (in previous research) been assumed to be unproblematic. This does, however, raise the problem of distribution. When dealing with individual items it is common to find that the distribution is non-normal. Bootstrapping will have to be performed with each of the structural models in order to test that the model is still well fitting and to consider the distribution of scores (i.e. the fit measures as well as the regression weights).

In this chapter I have outlined my reasons for the methodological approach taken and the variety of ways in which one can assess how well fitting the models representing the hypotheses are when subjected to this stringent statistical approach. The next chapter will test the hypotheses outlined earlier, beginning with a consideration of the four outcome behaviours of interest (research seeking, research utilisation, evidence-based practice and the political use of research information), and then testing the predicted group differences.

CHAPTER 6: THE ANALYSIS PART 1 – THE NONRECURSIVE MODELS

6.1 Introduction and hypotheses

Whilst it has frequently been suggested that the parameter weights can be over or underestimated if we consider only recursive models, a great deal of research has focused on the extent to which attitude predicts behaviour and vice versa. However, nonrecursive structural equation modelling enables us to consider the reciprocal relationship between these two constructs simultaneously. It is unrealistic to assume that *attitude to research* does not predict *research utilisation*, or that *research utilisation*, in turn, would not have an impact upon *attitude to research.* This makes sense theoretically. One would expect that a positive attitude would encourage the behaviour, but also that, once the behaviour has been performed, it in turn promotes a positive attitude. In part 1 of the analysis I shall be employing nonrecursive models, with the intention of providing an insight into the ways in which past behaviour might influence future behaviour via a number of mechanisms suggested by the literature. The behaviours: *research utilisation, research seeking, evidence-based practice* and *political utilisation of research evidence* will each be considered in turn, using nonrecursive models to identify the predictor and outcome variables related to each. As I shall be employing the full structural model, in order to maintain a good sample size to parameter ratio, it was necessary to parcel the variables as previously discussed. (When I employ this term I am referring to the summing of items into one variable with its residual set to 1-reliability x variance)

The focus of this chapter will be on the first set of objectives outlined earlier:

To expand the theory of planned behaviour (and expectancy theories more generally) by utilising nonrecursive structural equation modelling to explore the impact of past behaviour on future behaviour.

1. The variables identified in the Theory of Planned Behaviour will predict a high degree of the variance in research utilisation, research seeking and evidence-based practice.

2. Personality variables (i.e. *need for cognition*): *academic achievement*, *experience* and *grade:* and environmental factors (*organisational learning climate* and *managerial influencing style*) would be important additional predictors to those identified in the Theory of Planned Behaviour.

3. Nonrecursive models will obtain improved measures of fit, as the recursive model (specified by the TPB) ignores causal relationships between the predictor variables, some of which will impact directly upon the behaviour, others via their impact on *attitude to research.*

4. The original model's use of broad constructs (assumed to be unidimensional) will disguise the way in which sub-factors within these global constructs operate differently in predicting behaviour.

5. The recursive model will be overly simplistic, in that it does not predict how past behaviour might influence future behaviour via the following mechanisms:

e. Increasing skill level (self efficacy)

f. Improved *attitude to research*

g. Increasing views about mastery over external environment (*extrinsic PBC –time, access, authority*)

h. Via *perceived improvements*

- and thereby over or under predicting the regression weights.

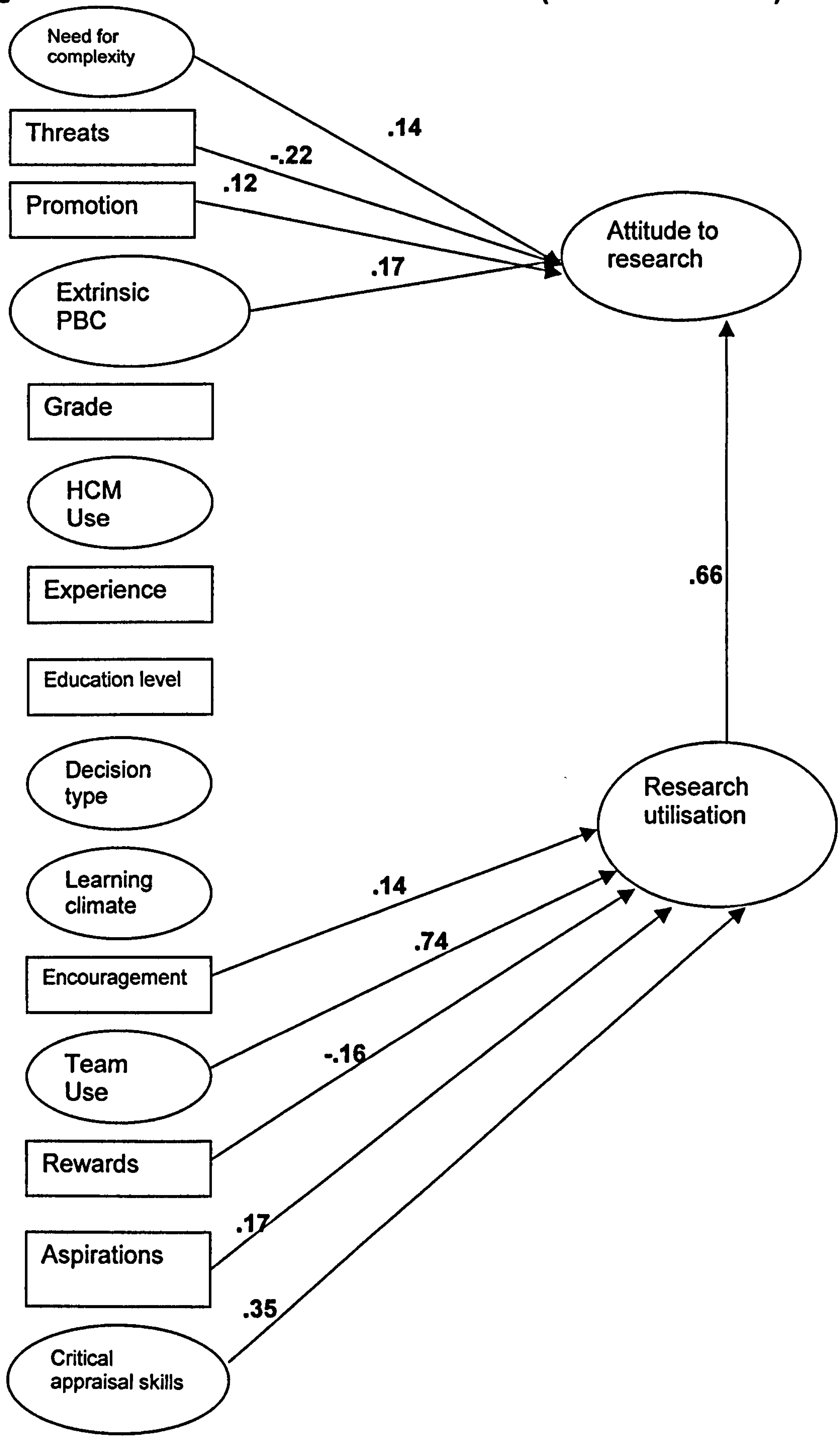
6.2 <u>The recursive models</u>

I shall begin by examining the recursive models related to each of the behaviours, considering the extent to which the predictor variables explain the variance in *attitude to research* when the behaviour is controlled for, and the extent to which those variables predict the behaviour modelled, having controlled for *attitude to research*.

Page intentionally blank

Page intentionally blank

Figure 6.1 Predictors of *attitude to research* – (*research utilisation*)



(Correlations between the predictor variables are not shown)

Chi-square = 332.687

Degrees of freedom = 71

Probability level = 0.000

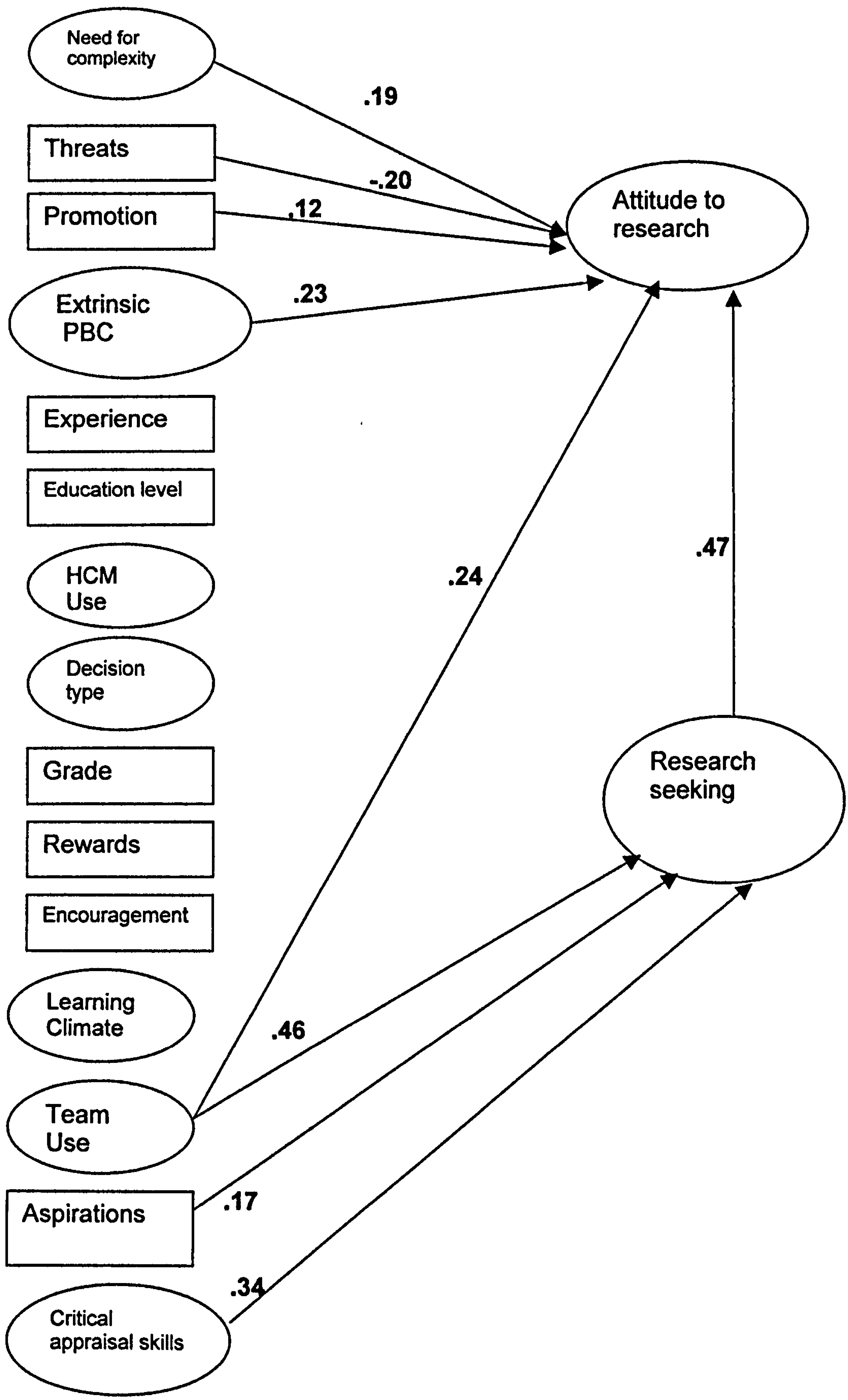
GFI .89   IFI .80

Rmsea .085-1.06

Hoelter 112

Paths between predictor variables and *attitude to research* and *research utilisation* are not shown where they failed to reach a level of significance. None of the items related to *managerial influencing style* proved to be significant predictors, with the exception of *a threatening and demanding influencing style* (identified as 'threats' in the above model), and so the construct has been dropped figure 6.1. When the items related to *perceptions of use by healthcare managers* ('HCM use') were included in the model separately, they still failed to predict any more of the variance in *attitude to research.* These findings were common to all of the models tested.

Figure 6.2 Predictors of *attitude to research* – (*research seeking*)



(Correlations between the predictor variables are not shown)

Chi-square = 291.931

Degrees of freedom = 93

Probability level = 0.000

GFI .92 IFI .82

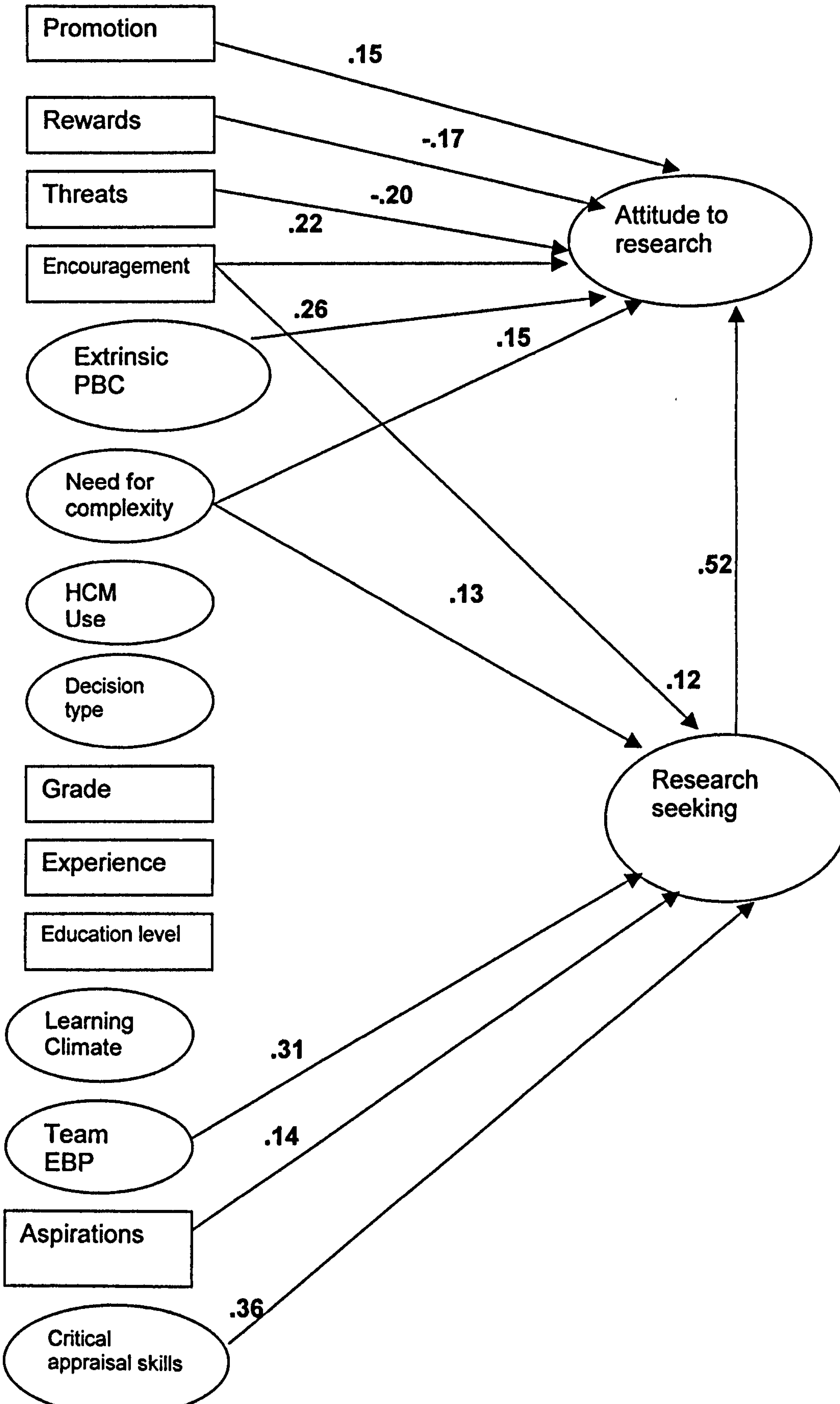
Rmsea .064

Hoelter 161

Paths between predictor variables and *attitude to research* and *research utilisation* are not shown where they failed to reach a level of significance.

We can see that the recursive model is again a poor fit. It is also worth noting that there is a direct path from *team use of research* to *attitude to research* in the model where the behaviour of interest is *research seeking*. This would cause problems with the identification of the model, and so the model was re-run using the variable *team adoption of evidence-based practice*, rather than *team utilisation of research.*

Figure 6.3: Revised model. Predictors of *attitude to research* – (*research seeking)*



Chi-square = 333.739

Degrees of freedom = 70

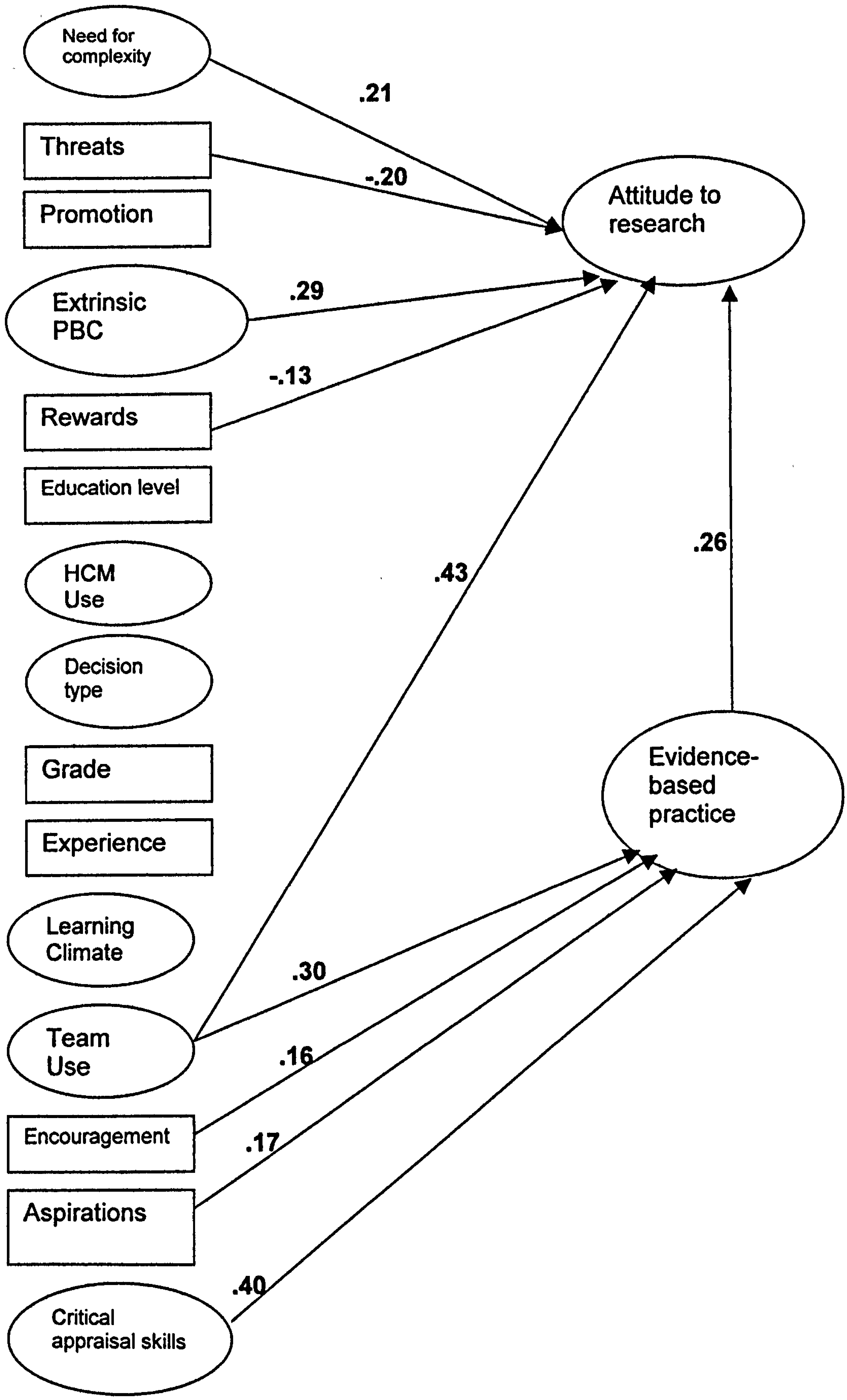
Probability level = 0.000

GFI .90   IFI .76

Rmsea .086 -.107

Hoelter 110

Figure 6.4 Predictors of *attitude to research* – *Evidence-based practice*



(Correlations between the predictor variables are not shown)

Chi-square = 338.114

Degrees of freedom = 72

Probability level = 0.000

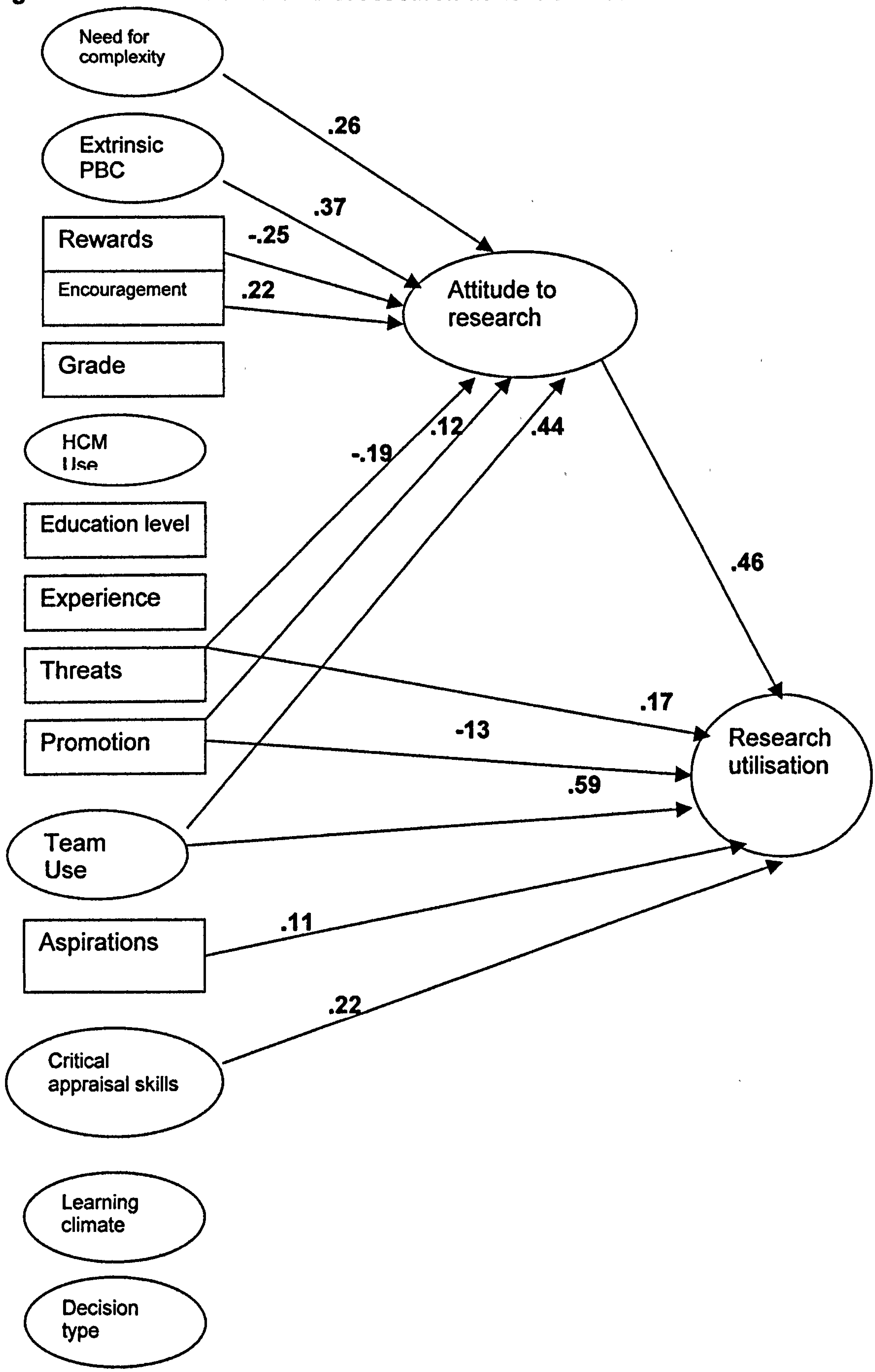
GFI .90 IFI .76

Rmsea .086-.106

Hoelter 111

In this recursive model where we are considering the *adoption of evidence-based practice*, *team utilisation of research* is a far stronger predictor of *attitude to research*, even once we have controlled for the *individual adoption of evidence-based practice (EBP).* Again, we need to be aware of the implication of this when considering the nonrecursive models.

Figure 6.5 Predictors of *research utilisation* – recursive model



(Again, correlations between exogenous variables are not shown in order to aid clarity).

Team utilisation of research is a strong predictor of both *attitude to research* and *individual research utilisation* in this recursive model. *A threatening and demanding management style* appears to have a negative impact on respondents' *attitude to research*, but having controlled for the latter, a positive direct impact on *research utilisation. Extrinsic rewards* had a negative impact upon respondents' *attitude to research. Promotion* linked to research expertise has a positive impact on *attitude to research* but a negative impact on *research utilisation.*

Chi-square = 314.517

Degrees of freedom = 68

Probability level = 0.000

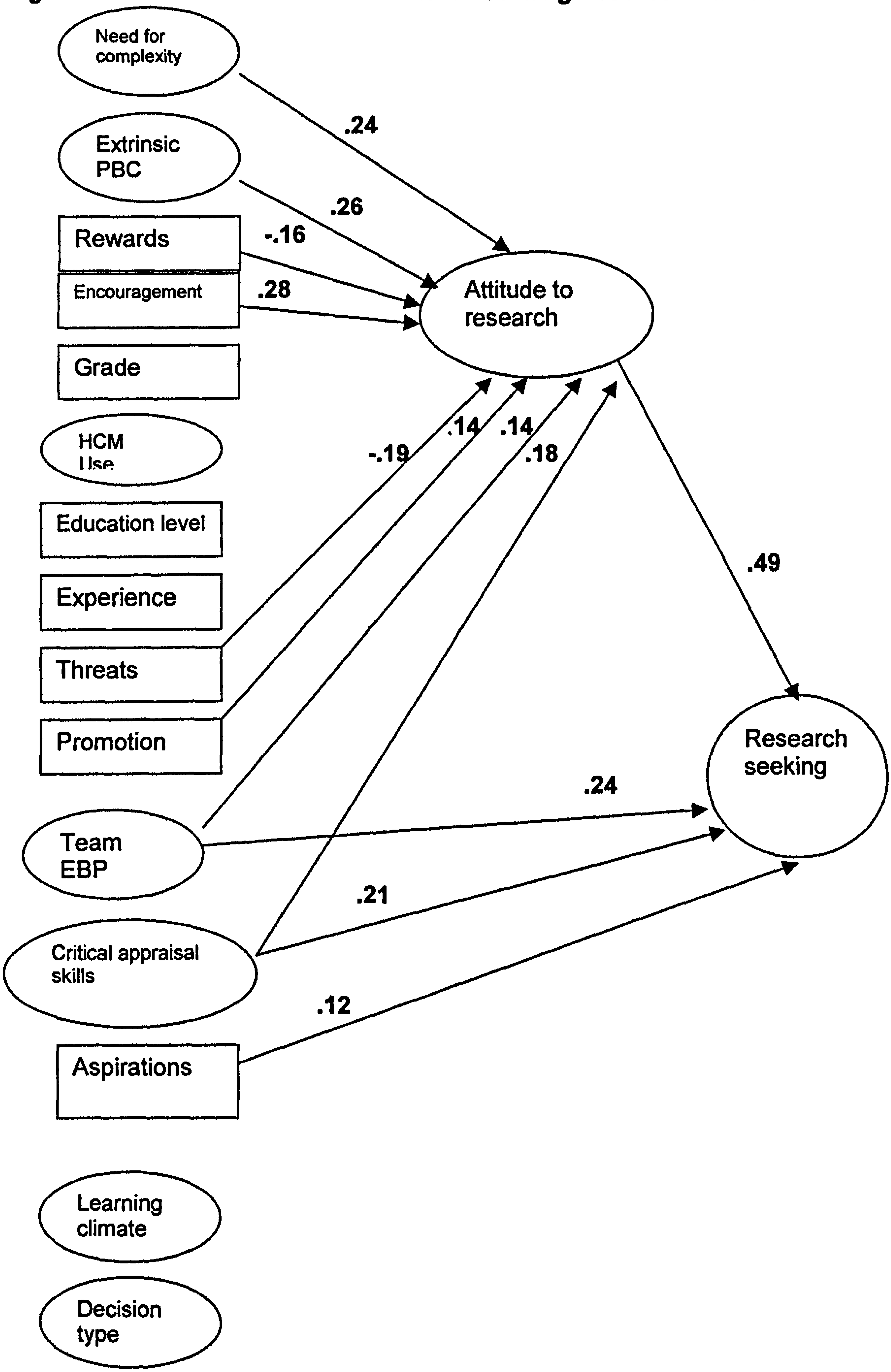
GFI .90   IFI .81

Rmsea .084 - .106

Hoelter 110

In a final consideration of the recursive models I will examine the parameter weights from *attitude to research* to *research seeking* and then from *attitude to research* to *evidence-based practice.*

Figure 6.6 Predictors of *research seeking* – recursive model



Chi-square = 342.250

Degrees of freedom = 70

Probability level = 0.000

GFI .89 IFI .75

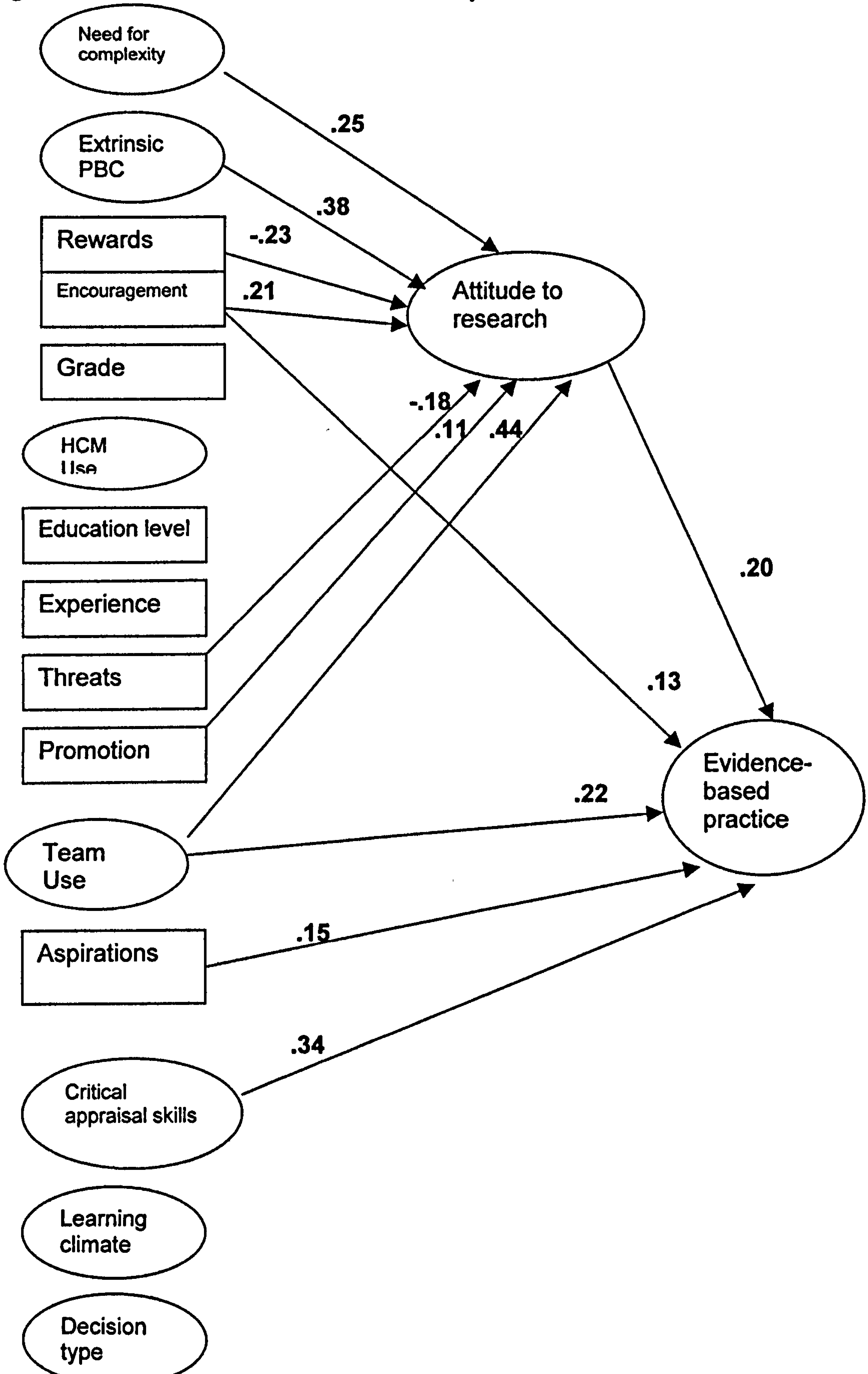
Rmsea .088 -.109

Hoelter 107

In this model, *a threatening and demanding management style* and the belief that *promotion* is linked to research expertise, have no direct impact on *research seeking.*

The nonrecursive model appears to be identified.

Figure 6.7 Predictors of *evidence-based practice*– recursive model



Chi-square = 330.555

Degrees of freedom = 70

Probability level = 0.000

GFI .90 IFI .77

Rmsea .087-.107

Hoelter 111

We can see that the ability of *attitude to research* to predict *evidence-based practice* is far weaker; in fact *critical appraisal skills* appears to be the strongest predictor.

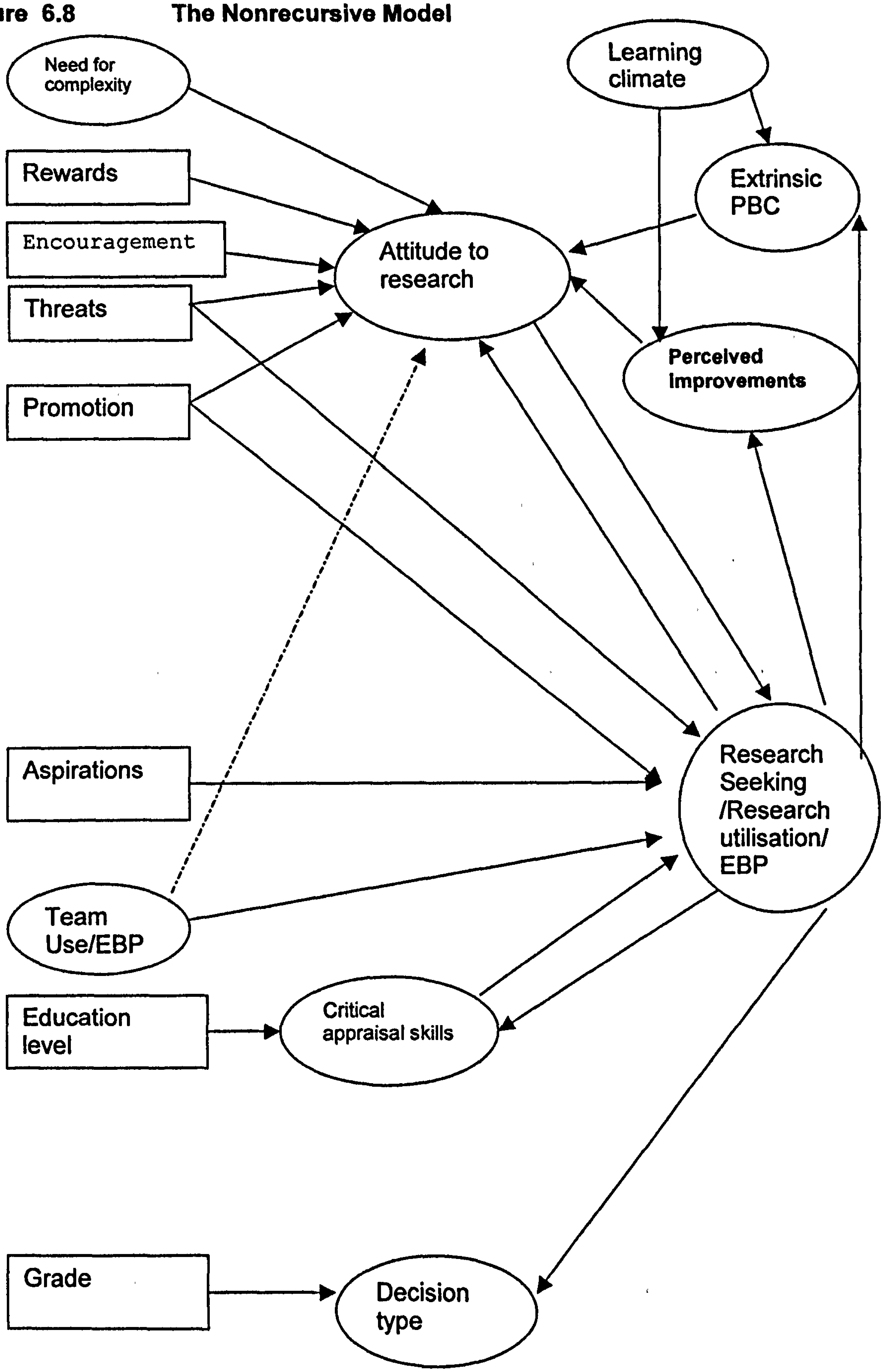
6.3 The nonrecursive models

It is now possible to compare the recursive models with the nonrecursive models in order to test the hypotheses. Below, I have diagrammed the model to be tested, leaving out those variables which we now know are unable to predict any additional variance in the behaviours of interest.

The nonrecursive model, if identified, is able to account for the reciprocal relationship between attitude and behaviour, and, having controlled for this relationship, examine how the predictor variables impact upon the behaviour (i.e. via attitude or directly). It can also examine the impact of *perceived improvements* arising out of *evidence-based practice*, upon *attitude to research*. In addition, the model also enables me to test the hypothesis, suggested by the literature, that *extrinsic and intrinsic perceived behavioural control* can be both predictor and outcome variables.

We know from the recursive models that neither *organisational learning climate* nor *decision type* predict any of the variance in *attitude to research* or any of the behaviours modelled. However, both of them will be retained in the nonrecursive model. *Organisational learning climate* will be used to identify *extrinsic perceived behavioural control,* as we would expect that a supportive learning climate would predict the resources made available to encourage *research utilisation* and *evidence-based practice.* I have also predicted that a supportive *learning climate* will predict *perceived improvements* over and above that accounted for by the other variables in the model, as there are liable to be aspects of a *supportive learning climate* which ensure that the behaviour encouraged translates into a positive impact in the workplace. The literature suggests that *research utilisation* and *evidence-based practice* could potentially contribute to the greater involvement of individuals in the decision making process. This can be tested in the nonrecursive models that follow:

Figure 6.8 The Nonrecursive Model



6.3.1 Testing the Nonrecursive Models

All of the variables in the feedback loop need to have their own instrumental variable(s); *organisational learning climate* was used to identify *extrinsic PBC*, *education* to identify *critical appraisal skills*, and *need for complexity* to identify *attitude to research*. The expectation had been that *team utilisation of research* would act as an instrumental variable to each of the outcome behaviours. However, as one must ensure that the variables that identify endogenous variables in any reciprocal relationship do not also impact upon other variables within that feedback loop, it is disappointing to find that I may not have an instrumental variable to predict *evidence-based practice* and *research seeking*. In both these instances *team utilisation of research* also has a direct impact on *attitude to research*. The model employed to examine *research utilisation* does appear to be identified.

The dotted arrow between *team utilisation of research* and *attitude to research* is a reminder that for at least two of the models (when I consider *research seeking* and the *adoption of evidence-based practice*) the model may not be identified unless an alternative instrumental variable can be used to identify the behaviours. An examination of the recursive models above suggests that only the variable *aspirations* could potentially perform this role, although it is only a very weak predictor of the behaviour. A further option, in the case of *evidence-based practice,* is to utilise the variable that considers the extent to which the respondent's team has adopted this practice. This will be employed in the model that follows.

It is worth attempting to identify the models in this way, as difficult as the task might appear, because if one is able to meet both the rank and order conditions for identification, it enables one to compare the regression weights when we assume: (1) A recursive model as per the theory of planned behaviour and (2) A nonrecursive model where prior behaviour is explicitly modelled.

As per the hypothesis outlined earlier, there are four reciprocal relationships (although it may not be possible to test all four simultaneously in each of the models).

- *Attitude to research* to the outcome behaviour
- Behaviour to *extrinsic PBC* to *attitude to research* to behaviour
- Behaviour to *intrinsic PBC* (*critical appraisal skills*) to *attitude to research* to behaviour
- Behaviour to *perceived improvements* arising out of that behaviour

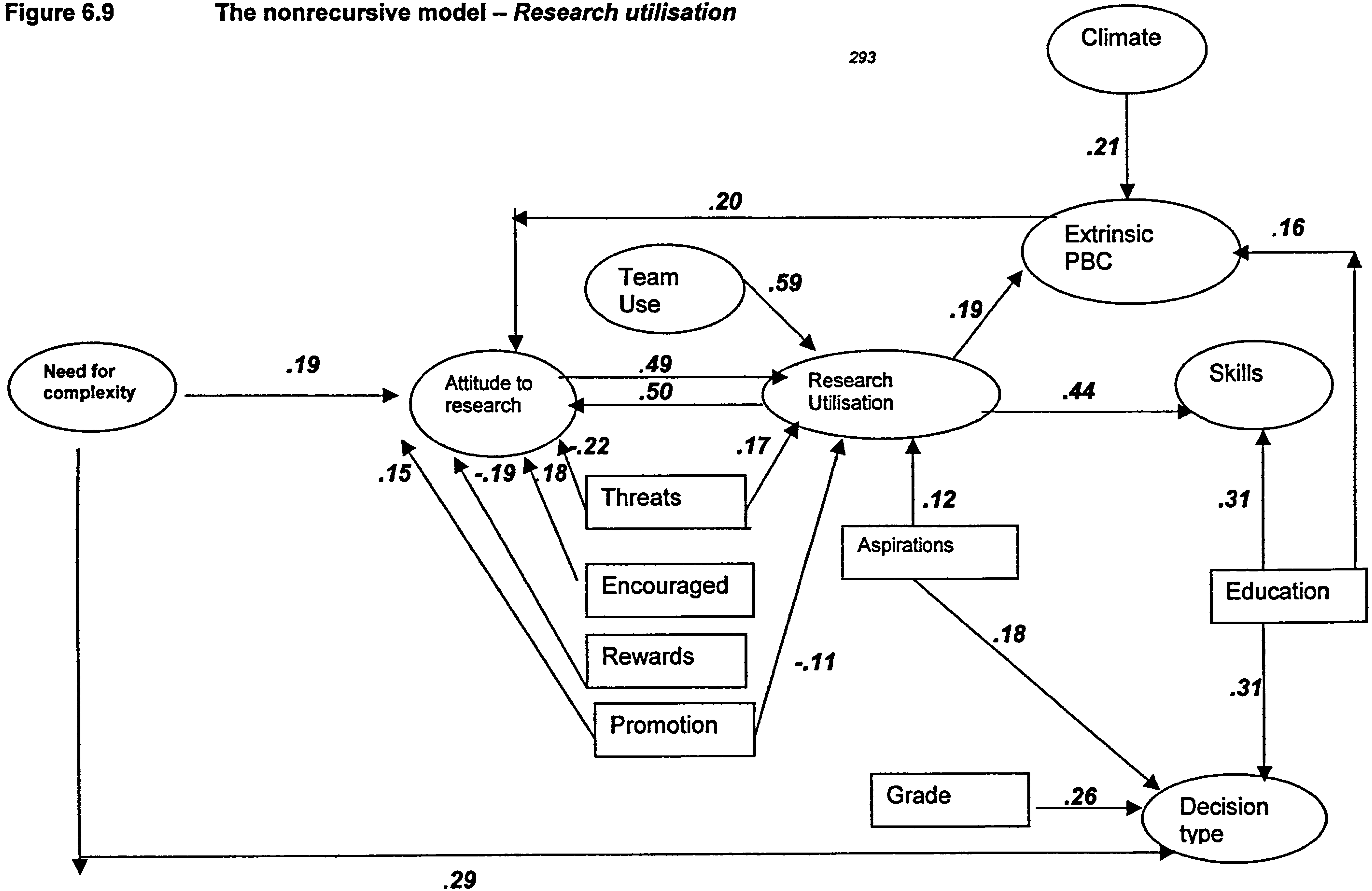
Note that due to limited space in the survey the items related *perceived improvements* were specifically about improvements arising out of *evidence-based practice*. So whilst it is possible to include this variable in all three models it may behave differently simply because of the way in which the questions were phrased and interpreted.

I have modelled each of the behaviours of interest below, in order to examine whether or not the models can be identified, starting with research utilisation.

Note that the model represents each of the hypotheses to be tested, and their interrelationships, with respect to the outcome variable 'research utilisation'.

I shall then go on to test the same model with respect to the behaviours research seeking, the adoption of evidence-based practice, and the political use of research evidence.

Figure 6.9 **The nonrecursive model – *Research utilisation***



Chi-square = 90.690

Degrees of freedom = 61

Probability level = 0.008

GFI .97 IFI .98

RMSEA .014 - 049

Hoelter 357

Stability index .280

All of the parameters shown are significant (<1.96). As with the recursive model, *experience* predicted no additional variance in either *research seeking* or *attitude to research*, and was deleted from the model. All items related to *managerial influencing style* were tested but, as with the recursive models, predicted no additional variance, with the exception of *a threatening and demanding influencing style.*

Need for cognition identifies *attitude to research*, but not *research utilisation*, and *team utilisation of research* is not a significant predictor of *attitude to research* when we control for *individual research utilisation*; the model meets both the rank and order conditions for identification as the identifiers predict only one variable in the feedback loop.

We can see that, in terms of the anticipated feedback loops, there appears to be a direct reciprocal relationship between *attitude to research* and *research utilisation*; and from *research utilisation* to *extrinsic perceived behavioural control* that then predicts future behaviour via *attitude to research.* The *use of research,* therefore, appears to have a direct impact on *attitude to research* over and above that explained by other variables in the model. We can also see that, contrary to expectations of the Theory of Planned Behaviour, *extrinsic perceived behavioural control* predicts research use only indirectly. *Decision type* did not predict any of the additional variance in the model and so could potentially be examined separately in order to maintain a good sample size to parameter ratio. Surprisingly, *critical appraisal skills* did not predict any additional variance in either *attitude to research* or *research utilisation*; it is, however, predicted ***by*** *research utilisation. Perceived improvements* did not predict any of the variance in *attitude to research* or *research utilisation*, which is probably due to the phrasing of the question, but this will be tested when I consider the predictors of *evidence-based practice.*

There was a suggestion in the literature that where the instrumental effects have very different regression weights to their corresponding endogenous variables, then the effect from the more strongly defined variable to the weaker variable may be smaller than the reverse effect (Wong and Law, 1999). We can see, however, that the impact of *research utilisation* on *attitude to research* has an identical regression weight to that from *attitude to research* to *research utilisation*; suggesting that measurement error resulting from identification problems is not having a significant effect on the resulting estimates. In fact, both variables have more than one instrumental variable.

A comparison of the recursive and nonrecursive models related to *research utilisation*

(Standardised total effects)

The figures in parentheses arise from the recursive model where *research utilisation* has been allowed to predict *attitude to research* –outside parenthesis the reverse is the case –*attitude to research* has been allowed to predict *research utilisation*. In the nonrecursive model, standardised *direct* effects are shown in parentheses { }

Table 6.1* *Variance explained in research utilisation

% of the variance explained

	REWARD		**ENCOURAGED**		**ASPIRATIONS**		**PROMOTION**	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	-6% (-3%)	-7% {-4%}	5% (0)	6% {3%}	0 (0)	1% {0}	1% (1%)	1% {2%}
Research utilisation	-1 (-1%)	-2% {0}	1% (2%)	1% {0}	1% (3%)	3% {1%}	0 (0)	0 {-1%}

	THREATS		TEAM USE		NEED FOR COMPLEXITY		EXTRINSIC PBC	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	-3% (-5%)	-3% {-5%}	19% (24%)	18% {0}	7% (2%)	7% {4%}	14% (3%)	7% {4%}
Research utilisation	0 (0)	!% {-3%}	62% (54%)	63% {35%}	1% (0)	2% {0}	3% (0)	2% {0}

	SKILLS		ATTITUDE TO RESEARCH		RESEARCH UTILISATION	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	0 (12%)	0 { 0}	0 (0)	13% {0}	0 (44%)	52% {25%}
Research utilisation	5% (5%)	0 {0}	23%(0)	45% {24%}	0 (0)	13% {0}

When we compare the nonrecursive model with the recursive model where *attitude to research* predicts *research utilisation*, the latter model slightly underestimates the impact of *rewards, need for complexity* and *aspirations* upon *research utilisation*, when compared with the former, but it is a very small difference. The impact of *extrinsic PBC* is slightly over-inflated, and *critical appraisal skills* is more significantly over inflated in terms of its ability to predict *research utilisation* as, in the nonrecursive model, we can see how the relationship is actually in the reverse direction. Whilst the direct impact of *attitude to research* on *research utilisation* is the same in both models, the total effect is higher in the nonrecursive model due to the reciprocal relationship proposed.

When the nonrecursive model is compared with the recursive model where *research utilisation* predicts *attitude to research*, the latter model slightly underestimates the impact of *rewards, need for complexity* and *extrinsic PBC. Team utilisation of research evidence* is more significantly underestimated, and *critical appraisal skills* is once again overestimated in the recursive model. This model cannot consider the impact of *attitude to research* on *research utilisation.*

Enabling the reciprocal relationship between *attitude to research* and *research utilisatio*n does not affect the parameter weights of the predictor variables a great deal, but it does enable us to get a better indication of the relationship between the variables Both *decision type* and *critical appraisal skills* are outcome rather than predictor variables, and *organisational learning climate* is only a weak, indirect predictor of *research utilisation* via its impact on *extrinsic PBC.* The latter is both an outcome of *research utilisation* and a predictor of it, via its impact on *attitude to research.*

I was also concerned to check that the way in which the variables were identified did not affect the model structure as the literature suggested it might. I substituted *team utilisation of research evidence* for *team adoption of evidence-based practice* and re-ran the model. The latter was able to identify individual *research utilisation,* as it did not predict any of the variance in the other variables in the feedback loop. The model was still well fitting:-

Chi-square = 107.418

Degrees of freedom = 62

Probability level = 0.000

GFI .97 IFI .96

RMSEA .029 - 056

Hoelter 306

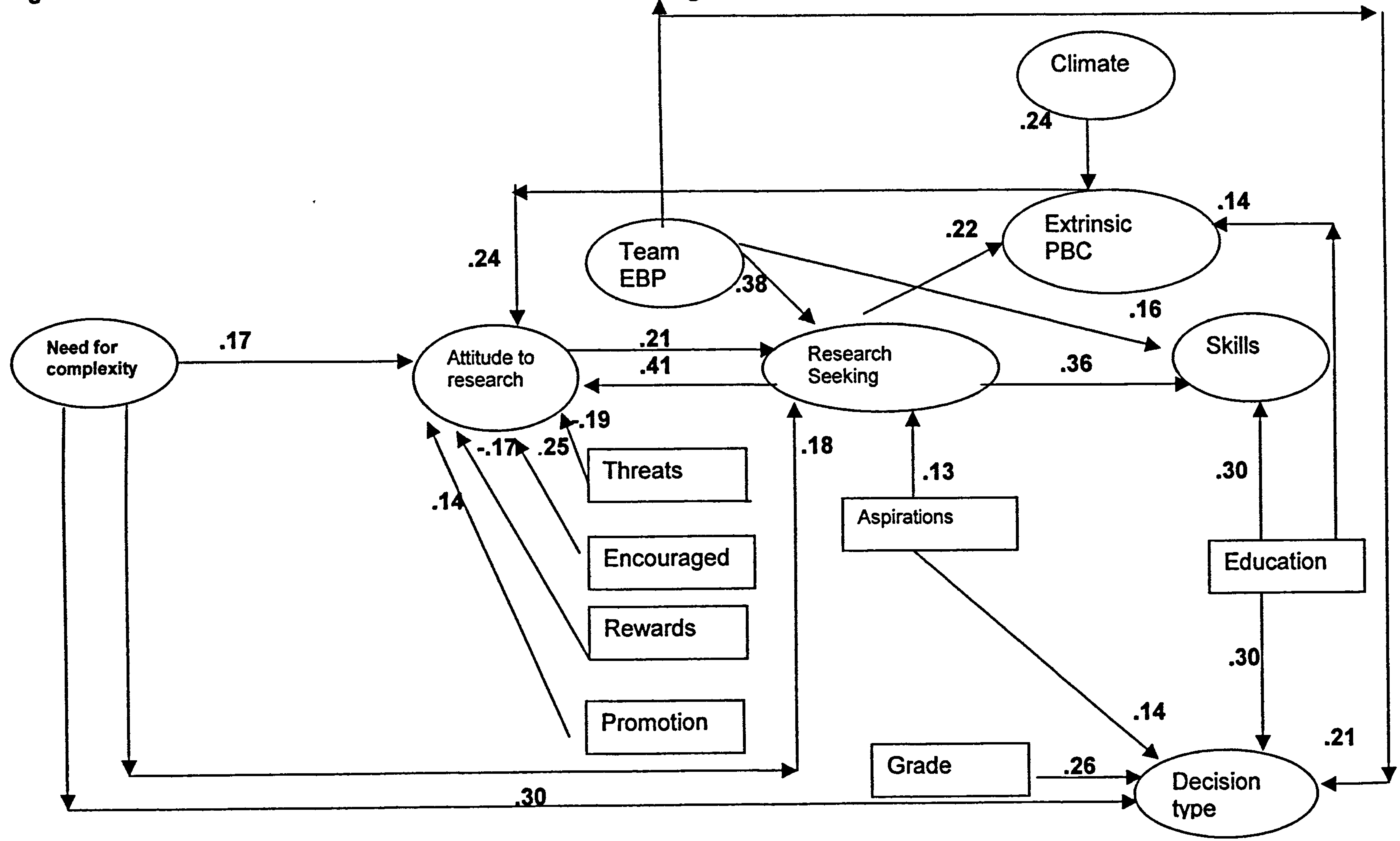
Stability index .227

As we would expect, the impact of *team adoption of evidence-based practice* is a slightly weaker predictor of *attitude to research* (it explains 16% of the variance, whereas *team use of research* explains 18%). This leads to a difference in the parameter weights from *individual research utilisation* to *attitude to research* (24%) from that found in the original model (52%). It also means that there is a difference in the parameter weights in the reverse direction, from *attitude to research* to *individual research utilisation* (58%) rather than 45% in the original model. The substitution does not alter the structure of the model, or the majority of the parameter weights, but it does affect those parameter weights in the reciprocal relationship. The implication is that, whilst we know behaviour and attitude are directly related, we should also consider the strength of that entire relationship, as well as the specific parameters. In order to do this, I allowed the disturbance terms of these two variables to be correlated, but removed the paths. The correlated disturbance terms was .71 in the first model, and .72 in the second, so very little difference in terms of the strength of the relationship between the two reciprocal variables.

The nonrecursive model – *research seeking*

Figure 6.10 below shows that it is in fact possible to identify the nonrecursive model, which examines the predictors of *research-seeking*. As with the recursive models, I have used *team adoption of evidence-based practice* to identify *research seeking.*

Figure 6. 10 The nonrecursive model – *research seeking*



Chi-square = 76.947

Degrees of freedom = 60

Probability level = 0.069

GFI .98 IFI .99

RMSEA .00-.042

Hoelter 415

Stability index .119

All of the parameters shown are significant (>1.96).

Note that *need for complexity* is also a predictor of *research seeking* in this model, however, *attitude to research* remains identified.

Team adoption of evidence-based practice appears to be a direct predictor of *decision type* and *critical appraisal skills*, although when we consider *individual adoption of evidence-based practice* we will see that these relationships are mediated via that variable rather than *team adoption* being a direct predictor. The strength of the relationship between *attitude to research* and *research seeking* is lower than that between *attitude to research* and *research utilisation*; a positive *attitude to research* predicts only 4% of the variance in *research seeking*, whereas *research seeking* predicts 17% of the variance in *attitude to research*. It is surprising that *team adoption of evidence-based practice* is a higher direct predictor of *research seeking* in the nonrecursive model than it is in the recursive model.

Promotion linked to research *expertise, rewards, encouragement* and *a threatening and demanding management style*, all fail to predict any of the variance in *research seeking*, which is presumably a more solitary activity than *research utilisation*, and therefore less prone to external influences, although individuals will undertake more *research seeking* where there is a culture of evidence-based practice within the team. The structure of the model, in terms of how past behaviour might influence future behaviour, is the same as when I considered *research utilisation* earlier. *Perceived improvements* again failed to predict any variance in either *attitude to research* or *research seeking.*

A comparison of the recursive and nonrecursive models related to *research seeking.*

(Standardised total effects)

The figures in parentheses arise from the recursive model where *research seeking* has been allowed to predict *attitude to research*, outside parenthesis the reverse is the case, *attitude to research* has been allowed to predict *research seeking*. In the nonrecursive model, standardised *direct* effects are shown in parentheses { }

Table 6.2 *Variance explained in research seeking*

% of the variance explained

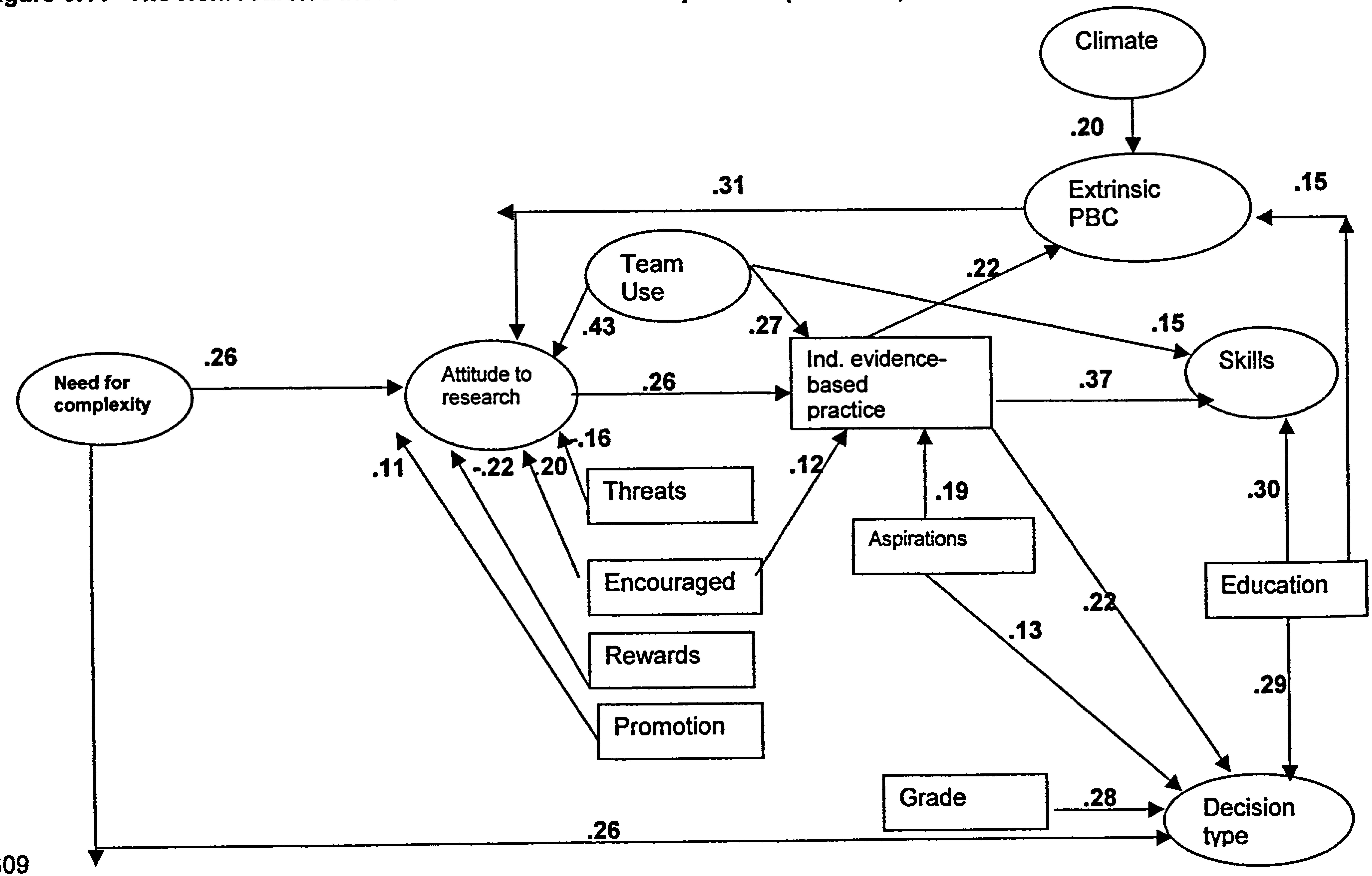
	REWARD		**ENCOURAGED**		**ASPIRATIONS**		**PROMOTION**	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	–2% (-3%)	-4% {-3%}	8% (8%)	8% {6%}	0 (0)	0 {0}	2% (2%)	2% {2%}
Research seeking	(0) 0	0 {0}	2% (2%)	0 {0}	1% (2%)	2% {2%}	0 (0)	0 {0}

	THREATS		**TEAM EBP**		**NEED FOR COMPLEXITY**		**EXTRINSIC PBC**	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	-4% (-4%)	-4% {-4%}	2% (3%)	4% {0}	6% (5%)	8% {3%}	7% (7%)	7% {6%}
Research seeking	0 (0)	0 {0}	6% (10%)	17% {14%}	1% (2%)	5% {3%}	2%(0)	0 {0}

	SKILLS		ATTITUDE TO RESEARCH		RESEARCH SEEKING	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	3% (3%)	0 {0}	0 (0)	1% {0}	0 (27%)	26% {16%}
Research seeking	9% (13%)	0 {0}	24% (0)	6% {5%}	0 (0)	1% {0}

Figures refer to standardised total effects unless otherwise indicated by { }

Figure 6.11 The Nonrecursive Model ***Evidence-based practice* (team use)**



Chi-square = 80.781

Degrees of freedom = 60

Probability level = 0.038

GFI .97 IFI .98

RMSEA .007-.045

Hoelter 395

Stability index .069

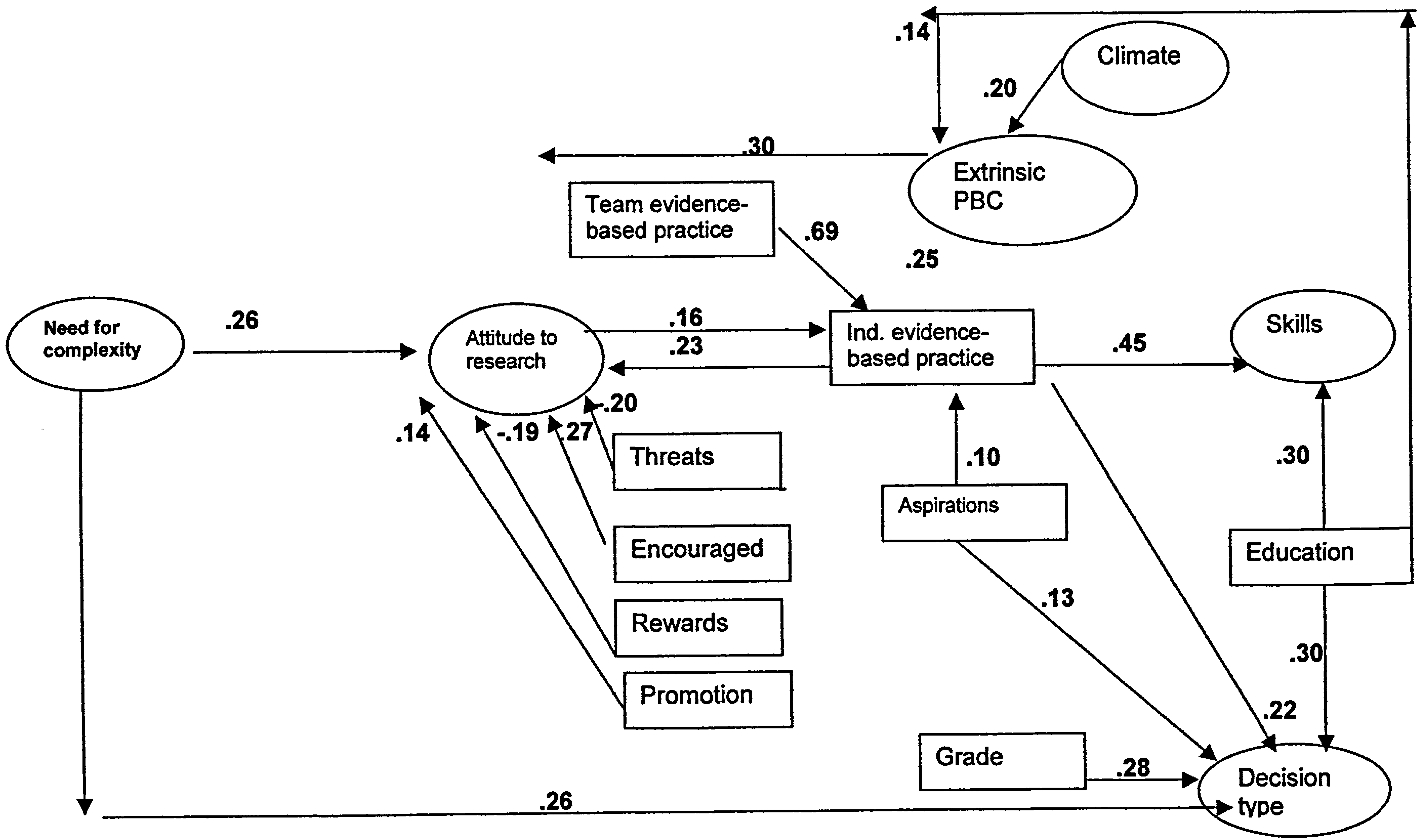
All of the parameters shown are significant (>1.96).

Individual adoption of evidence-based practice does not predict *attitude to research* directly, but does predict the latter via its impact on *extrinsic PBC*, which makes the model nonrecursive.

As mentioned earlier, I had decided to investigate if it was possible to get around the problem of the identification issues by using the variable *team adoption of evidence-based practice* rather than *team utilisation of research.* In the above model, however, the former does appear to be identified, albeit weakly, by *aspirations.* Nevertheless, I decided to re-run the model using *team adoption of evidence-based practice* as the instrumental variable for *individual adoption of evidence-based practice*, as it has no direct impact on *attitude to research.* The course of action was chosen as the literature suggests that there may be problems if one of the variables is very weakly identified in comparison to the other variable in the feedback loop.

The revised model follows:-

Figure 6.12 The revised nonrecursive model – *Evidence-based practice* (Team EBP)



Chi-square = 90.884

Degrees of freedom = 62

Probability level = 0.010

GFI .97 IFI .98

RMSEA .017-.048

Hoelter 361

Stability index .080

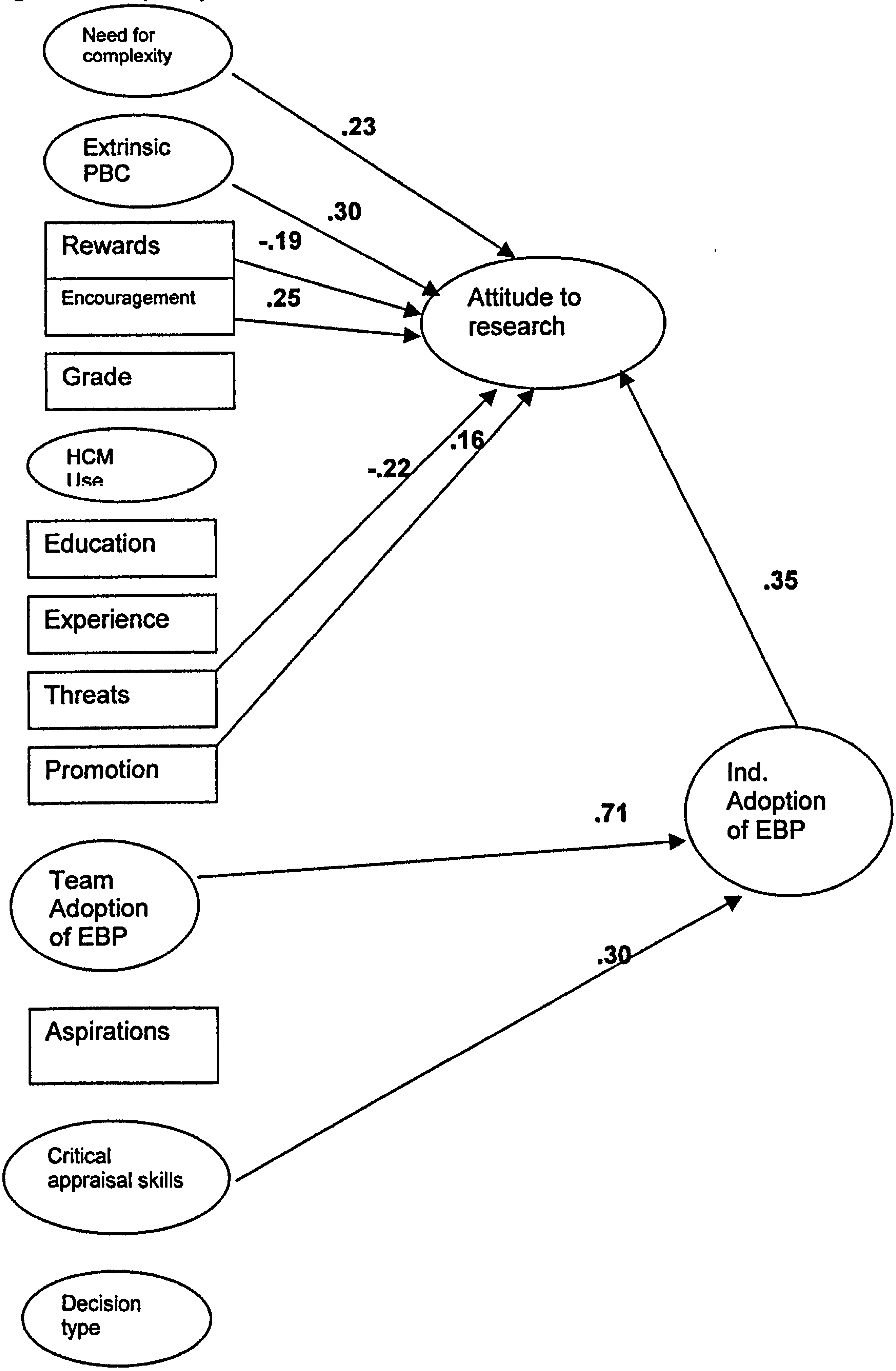
One can see that whilst the *adoption of evidence-based practice* appears to be a direct predictor of *attitude to research*, there is also an indirect reciprocal relationship between the two variables via *extrinsic PBC*. *Attitude to research* is a weak predictor of *evidence-based practice*, once we control for this practice amongst team members. It is interesting that again, the strength of the relationship between *attitude to research* and the *adoption of evidence-based practice* is almost identical, regardless of whether it is identified by *team adoption of EBP*, or *team utilisation of research.*

A comparison of the recursive and nonrecursive models related to *evidence-based practice.*

(Standardised total effects)

The recursive models have had to be recalculated to take into account the fact that 'team adoption of evidence-based practice' had been a necessary replacement in order to identify the model. The revised models follow:

Figure 6.13 (EBP) Predictors of *attitude to research.* (revised model)



315

Chi-square = 356.159

Degrees of freedom = 73

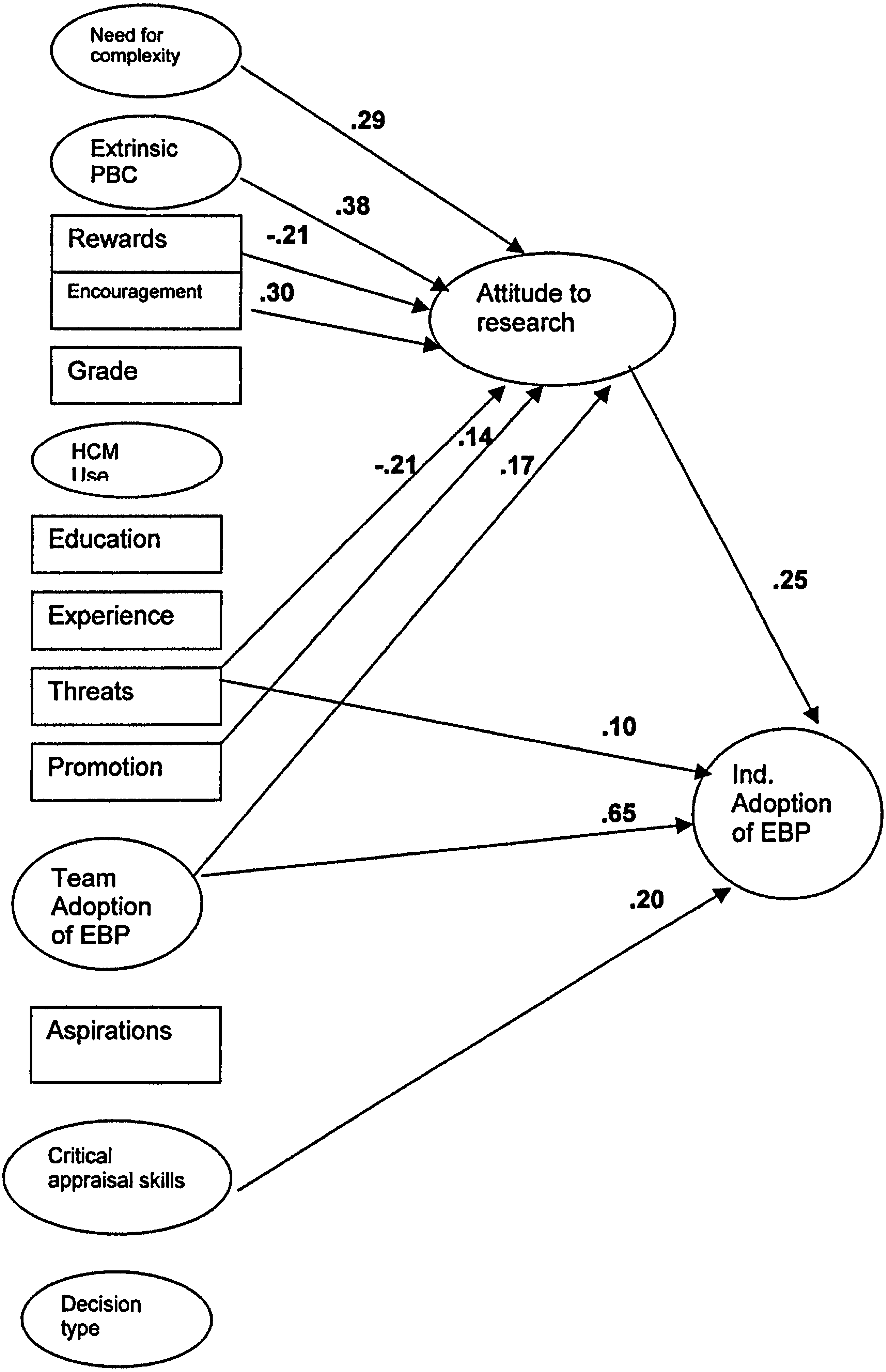
Probability level = 0.000

GFI .89 IFI .79

RMSEA .088-.108

Hoelter 107

Figure 6.14 Predictors of *evidence-based practice* (revised model)



Chi-square = 344.768

Degrees of freedom = 70

Probability level = 0.000

GFI .89 IFI .79

RMSEA .088-.109

Hoelter 106

Evidence-based practice

Again, the figures in parentheses arise from the recursive model where *adoption of evidence-based practice* has been allowed to predict *attitude to research*, outside parenthesis the reverse is the case, *attitude to research* has been allowed to predict *adoption of evidence-based practice*. In the nonrecursive model, standardised *direct* effects are shown in parentheses { }

Table 6.3 *Evidence-based practice – % variance explained*

	REWARD		ENCOURAGED		ASPIRATIONS		PROMOTION	
	Recursive	Nonrecursive	Recursive	Non-recursive	Recursive	Nonrecursive	Recursive	Non-recursive
Attitude to research	-4% (-3%)	-4% {-4%}	9% (6%)	8% {8%}	0	0 {0}	2% (3%)	3% {3%}
Evidence-based practice	0 (0)	0 {0}	0 (0)	0 {0}	0	1% {1%}	0 (0)	0 {0}

	THREATS		TEAM EBP		NEED FOR COMPLEXITY		EXTRINSIC PBC	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Non-recursive
Attitude to research	-5% (-5%)	-4% (-4%}	3% (6%)	5% {0}	8% (5%)	8% {7%}	16% (9%)	10% {9%}
Evidence-based practice	0 (0)	0 {0}	47% (50%)	52% {47}	0 (0)	0 {0}	1% (0)	0 {0}

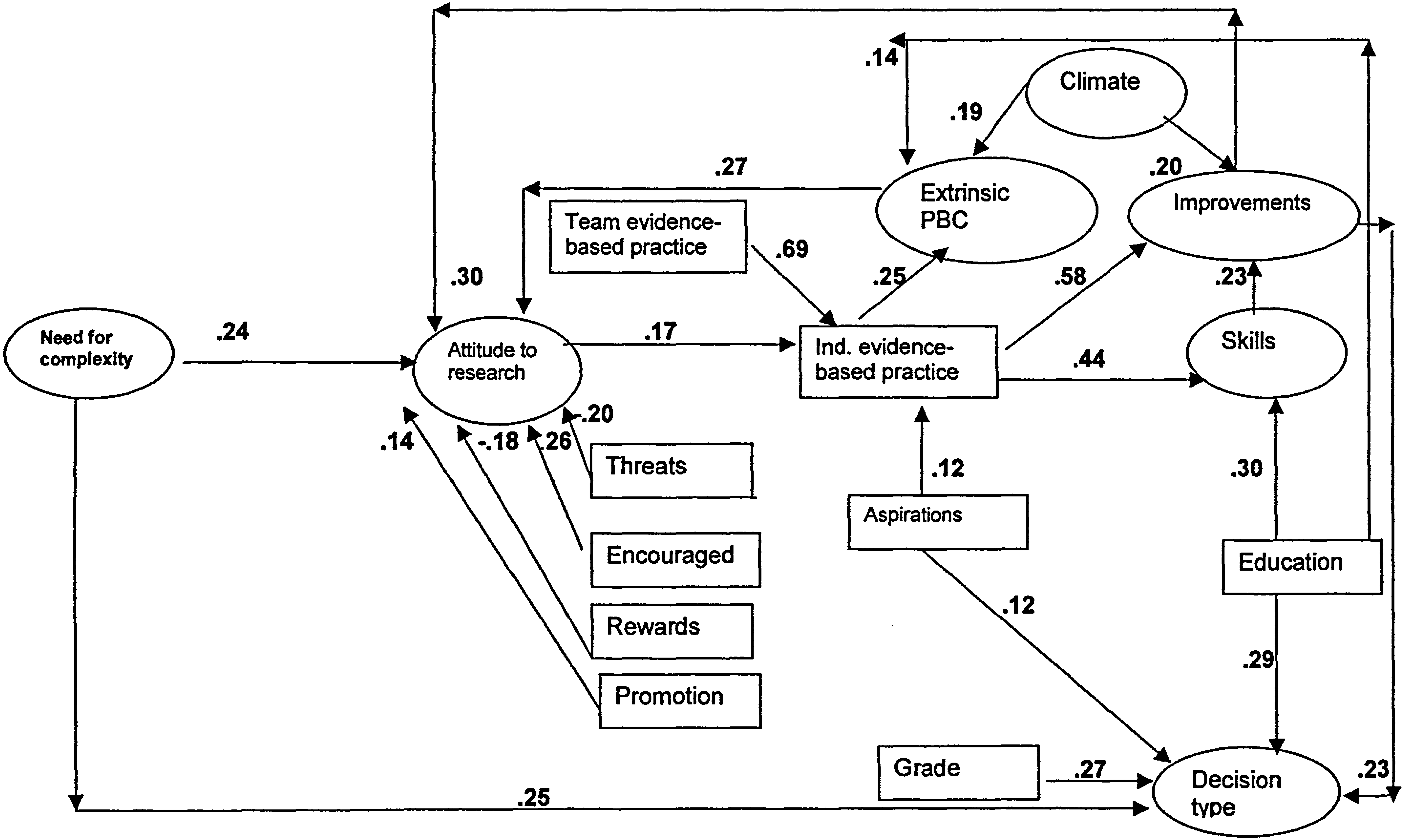
	SKILLS		ATTITUDE TO RESEARCH		INDIVIDUAL EBP	
	Recursive	Nonrecursive	Recursive	Nonrecursive	Recursive	Nonrecursive
Attitude to research	0 (1%)	0	0 (0)	0 {0}	0 (12%)	10% {5%}
Evidence-based practice	4% (9%)	0	6% (0)	3% {3%}	0 (0)	0 {0}

*Standardised direct effects shown in brackets (all other figures refer to standardised total effects)

Again, in the nonrecursive model which considers the impact of attitude on behaviour, as suggested by the Theory of Planned Behaviour, the regression weight is over-inflated, as it does not consider the impact of past behaviour on attitude.

With this model, it is possible to see the impact of *perceived improvements* which asked specifically about improvements related to *evidence-based practice:*

Figure 6.15 **The revised nonrecursive model – *Evidence-based practice* with *perceived improvements***



Chi-square = 122.028

Degrees of freedom = 75

Probability level = 0.000

GFI .96 IFI .97

RMSEA .026 -.052

Hoelter 318

Stability index 145

The relationship from *adoption of evidence-based practice* to *attitude to research* is via *extrinsic PBC* and *perceived improvements*. It does not appear to be a direct predictor. As *critical appraisal skills* predicts *perceived improvements*, it too is now a predictor of *evidence-based practice*, albeit a weak relationship.

6.4 The Findings from the analysis of the recursive and nonrecursive models

I shall now discuss each of the hypotheses in turn to clarify the extent to which they have been confirmed, and how the various moderating variables affected the findings, thereby testing the extent to which the Theory of Planned Behaviour ought to be extended, and the scope of the theory when one considers various moderating variables. I shall begin with an overview of the extent to which the theory is able to predict the variance in the outcomes of interest, and the findings related to the inclusion of past behaviour as a separate variable in the model with various feedback channels.

Hypothesis 1

The variables identified in the Theory of Planned Behaviour will predict a high degree of the variance in *research utilisation, research seeking* and *evidence-based practice.*

We can see that the variables included in both the recursive and nonrecursive models explain a high percentage of the variance in the behaviours of interest. There are clear trends, however. The most important predictors in both recursive and nonrecursive models are:

(1) *Team utilisation of research evidence* (or *team adoption of evidence-based practice)* and (2) *attitude to research.* The remaining variables explain, at most, only a further 12% of the variance even when combined. Of course, this still leaves the important question of how one might influence the individual's *attitude*

to research, as it is obviously important in predicting the behaviour of interest, once we have accounted for team behaviour. Neither *extrinsic* nor *intrinsic PBC* accounted for a great deal of the variance in any of the behaviours considered, once the nonrecursive models were employed.

Hypothesis 2

Personality variables (i.e. *need for cognition*); *academic achievement*, *experience* and *grade;* and environmental factors (*organisational learning climate* and *managerial influencing style*) would be important additional predictors to those identified in the Theory of Planned Behaviour. *Need for complexity* explains between 4% and 6% of the variance in *attitude to research*, but is only a weak predictor of the behaviours of interest (*research seeking, research utilisation* and *evidence-based practice*). I found, however, that *need for complexity* had a direct and significant impact on *decision type* suggesting that it can have an important impact on an individual's engagement in strategic decision making, even having controlled for *grade* and *education level. Education, experience, grade* and *decision-type* were not important predictors of the behaviours.

Whilst a *supportive learning climate* explains very little of the variance in the behaviours of interest, it does have an important role in the provision of *extrinsic PBC variables* (time, access, authority) and in ensuring that *research utilisation, research seeking* and *the adoption of evidence-based practice* actually generate greater improvements than might otherwise have been the case.

Working in an environment where *managerial influencing style is based on threats and demands* has a significant negative effect on *attitude to research*, but does appear able to promote the behaviour, once we have controlled for attitude.

Hypothesis 3

Nonrecursive models will obtain improved measures of fit, as the recursive model (specified by the TPB) ignores causal relationships between the predictor variables, some of which will impact directly upon the behaviour, others via their impact on *attitude to research*.

With the nonrecursive models, variables can be both predictors and outcomes of the behaviour of interest. This considerably improves model fit suggesting that the model is better able to represent what is happening in reality. It is how people make sense of the external stimuli that will determine their response to it. As hypothesised, we can see that certain stimuli do not necessitate one forming an opinion about the behaviour in question before engaging in that activity. For example, 'this is the group norm, and expected of me', or 'if I perform this behaviour I will be rewarded or avoid punishment.' None of these perfectly good reasons for behaving in a given way necessitate one deciding that the behaviour is, in itself, a good or useful activity (although they all may be). Yet, in the recursive model, ordinarily employed when testing the Theory of Planned Behaviour, the inter-relationships between predictor variables are not considered, other than suggesting that they may be correlated. The methodology generally employed in testing the TPB, would not allow this type of analysis.

Although it is undeniable that parcelling will have improved the fit of all of the models, only the nonrecursive models are well-fitting and appear to provide a good basis for further research. We can see that the relationships between *attitude to research* to both research seeking and *evidence-based practice* are far weaker than they are from *attitude to research* to *research utilisation*, but there appear to be sound theoretical reasons for this difference in the regression weights. In the case of *research seeking*, it is less likely to lead to a positive *attitude to research*, as there are not the explicit outcomes arising from *research utilisation*. In the case of *evidence-based practice*, it is a very precise definition which fewer individuals report engaging in, whereas they are more likely to report engaging in *research utilisation*. A positive *attitude to research* may not, therefore, result in *adoption of evidence-based practice* (even though it results in *research utilisation*). Of course, different regression weights between variables does not distract from the fact that the model (and therefore the theories underpinning the model) appears to hold true across a variety of groups and behaviours, as is the case here.

Hypothesis 4

The original model's use of broad constructs (assumed to be unidimensional) disguises the way in which sub-factors within these global constructs operate differently in predicting behaviour.

Intrinsic and *extrinsic PBC* both appear to predict *perceived improvements* even when we have controlled for the impact of *evidence-based practice.* People with higher *critical appraisal skills* and/or mastery over their environment (*extrinsic PBC)* can be expected to achieve higher results from engagement *in research* *utilisation* and *evidence-based practice*. We can see from the models that the use of these global constructs can be deceptive. They do not appear to be unidimensional, and *intrinsic* and *extrinsic PBC* variables behave quite differently in the model. In fact neither *intrinsic* nor *extrinsic PBC* explains a great deal of the variance in the model. *Intrinsic PBC* (i.e. *critical appraisal skills*) appears to be able to impact upon behaviour indirectly where such skills have generated improvements arising out of the respondent's engagement in the behaviour, and thereby encouraged a more positive attitude towards it. *Extrinsic PBC* (time, access and authority) also predicts the behaviours examined only indirectly, via its impact on *attitude to research*. Engagement in the behaviour is a stronger predictor of *PBC* (both *intrinsic* and *extrinsic*) than *PBC* is of the behaviour. Again, a recursive model would not consider this reciprocal relationship and it could therefore mask the actual causal direction of the relationship between these variables.

We can also see how social norms can behave differently depending upon whether they are intended to coerce the individual into the behaviour of interest, (through threats or demands), whether it is simply easier to go along with the established practice, or whether verbal encouragement is offered. The importance of the process of sense-making is not considered in the recursive model which overlooks the extent to which certain variables will lead to the individual feeling more positive about a given behaviour, and when they will lead directly to the engagement in that behaviour regardless of one's opinion of it.

Hypothesis 5

The recursive model will be overly simplistic, in that it does not predict how past behaviour might influence future behaviour via the following mechanisms:

a. Increasing *critical appraisal skills* (self efficacy)

The recursive model would not provide us with any information on how, or indeed whether, past behaviour might increase *intrinsic behavioural control (critical appraisal skills).* The model assumes that *intrinsic PBC* influences behaviour, but not explicitly how past behaviour might impact *intrinsic PBC.*

In the nonrecursive model, when I control for *education level, evidence-based practice* explains 19% of the variance in *critical appraisal skills*, which in turn predicts 6% of the variance in *perceived improvements. Perceived improvements* then predicts 9% of the variance in *attitude to research*. There appears, however, to be no reciprocal relationship between *research utilisation* or *research seeking* and *critical appraisal skills*, although this may be due to the absence of a relationship between *perceived improvements* and these behaviours. It is worth noting that we may also have found this reciprocal relationship when we considered *research-seeking* and *research utilisation,* had the questions about *perceived improvements* been more directly related to these behaviours.

b. Improved *attitude to research*

There does appear to be a direct reciprocal link between *attitude to research* and *research utilisation* and between *attitude to research* and *research seeking*. As mentioned above, in the cases of *research seeking* and *utilisation*, whether this relationship would remain in place if we had more direct questions about *perceived improvements* arising out of these behaviours, remains to be seen. Certainly in the case of *evidence-based practice*, where the questions about *perceived improvements* related directly to this behaviour, the relationship between the behaviour and *attitude to research* was via *perceived improvements* and *extrinsic PBC.*

c. Increasing views about mastery over external environment *(extrinsic PBC –time, access, authority)*

Research utilisation explains 4% of the variance in *extrinsic PBC*, which in turn predicts 4% of the variance in *attitude to research. Attitude to research* directly predicts 24% of the variance in *research utilisation*, so that we can see that a reciprocal relationship exists between *research utilisation* and *extrinsic PBC*. The same is true when we consider *research seeking*, although the relationship is weaker. *Research seeking* explains 5% of the variance in *extrinsic PBC*, which in turn explains 6% of the variance in *attitude to research*. The latter explains 4% of the variance in *research seeking*. Again, a reciprocal relationship exists between the adoption of *evidence-based practice* and *extrinsic PBC*, although there is a weak link back from *attitude to research* to the *adoption of EBP*. The latter predicts 6% of the variance in *extrinsic PBC*, which then predicts 7% of the variance in *attitude to research. Attitude to research*, however, explains only 3% of the variance in *evidence-based practice.*

d. Via *perceived improvements*

This applied only to the model where I considered the *adoption of an evidence-based approach,* for the reasons given above. In this instance we find that *EBA* predicts 34% of the variance in *perceived improvements* (even having controlled for *critical appraisal skills* and *organisational learning climate*) and *perceived improvements* predicts 9% of the variance in *attitude to research.* In turn *attitude to research* predicts 3% of the variance in the *adoption of an EBA.*

- thereby over or under predicting the regression weights to the behaviour.

The main difference is due to the fact that the recursive models ignore the fact that 'change begets change.' The nonrecursive model enables us to examine the parameter weights once we have controlled for the impact of the reciprocal relationships. In the recursive models, which consider the impact of attitude on the behaviours, the analysis allows me to enable *team use of research evidence* and *team adoption of evidence-based practice* to predict *attitude to research* as well as the behaviours, rather than simply have the two variables correlated, as the Theory of Planned Behaviour would suggest. In the nonrecursive model it becomes clear where team behaviour affects *attitude to research* only via individual engagement in that behaviour. The relationship between attitude and team behaviour then disappears.

Similarly in these models, it is possible to see that *extrinsic PBC* predicts the behaviours via *attitude to research.* Again the TPB would not take this into account, as extrinsic PBC and attitude would simply be correlated, thereby disguising the true relationship. Yet it seems reasonable to suppose that increasing one's sense of mastery over the environment (with respect to the performance of a given behaviour) would increase one's positive impression of that behaviour. The recursive models overestimate the impact of *extrinsic and intrinsic PBC* on the behaviours, as they assume they are direct predictors.

In certain instances the recursive model underestimates the impact of variables on the behaviours. For example, in the model which considered *research utilisation*, the impact of *a threatening and demanding management style* is underestimated by –3%, and when *research seeking* was modelled, the impact of *need for cognition* was underestimated by +4%. These are instances when these variables directly affect both the behaviours and *attitude to research*, even in the nonrecursive model.

When we consider the relationship from *attitude to research* to the behaviours modelled, the total effect of its impact on *research utilisation* is much higher in the nonrecursive model, because of the higher reciprocal effects. With *research seeking* the impact of *attitude to research* on the behaviour is much higher in the recursive model, as the strongest predictor in the relationship is from *research seeking* to *attitude to research*, which the recursive model fails to take into account, assuming the relationship to be unidirectional. The same is true when *evidence-based practice* is modelled. Essentially, the nonrecursive model enables one to assess the impact of the predictor variable upon *attitude to research* having controlled for the impact of past behaviour on that variable.

The next chapter will consider the hypotheses related to the second key objective outlined earlier. It is primarily concerned with testing the expected differences between the various sub-groups identified, when the nonrecursive model is employed.

CHAPTER 7: THE ANALYSIS - PART 2 THE PREDICTOR VARIABLES AND GROUP COMPARISONS

7.1 Introduction: Analysis of the Sub-groups

The intention is to identify those factors that support or prevent the adoption of *research utilisation* and *evidence-based practice* across a number of sub-groups, based on the findings from the nonrecursive model. The sub-groups considered are: clinical/non-clinical managers, high/low CPD, high/low grade and CASP trained/untrained. This chapter will therefore be an analysis of the remaining hypotheses. I shall start with an introduction to each of the sub-groups to be analysed and then explore specifically how these moderating variables alter the strength and direction of the relationships between the constructs tested earlier.

7.1.1 Clinical and non-clinical managers and clinical practitioners

I wanted to explore the extent to which past experience of the behaviour being considered in this analysis would impact upon the variables hypothesised to predict that behaviour. The history of *research utilisation* and *evidence-based practice* is far longer in the clinical arena, and comparisons with the non-clinical management groups would enable me to test a number of hypotheses related to the impact of experience and the environment in which the respondents' work. The literature suggests that there we would expect non-clinical managers to have greater difficulties in accessing and applying research in their day-to-day-work, and also that such practice is less common within this group. We would expect that clinical practitioners and clinical managers are significantly more experienced in *research seeking, research utilisation and evidence-based practice.*

Findings from the survey (differences are where p =<.05)

Clinical managers seek out and utilise significantly more research evidence than their non-clinical counterparts, with clinical practitioners seeking out and utilising the most research evidence. Clinical managers and practitioners also engage in more *political utilisation of research evidence*, although this is likely to simply reflect the fact that they engage in more research use generally. Clinical managers and practitioners also report higher levels of *evidence-based practice* by themselves and their teams. Clinical managers and practitioners were also more likely to believe that they were *encouraged* to *engage in evidence-based practice*, and unsurprisingly, report higher levels of *improvements* as a result of engaging in this behaviour. *Evidence-based practice* has, however, had a rather higher impact on non-clinical managers than I had been led to believe. Around 60% claim to have adopted an *evidence-based approach to practice*, at least to a moderate extent. Only 3% report that they have not utilised this approach at all in their work, with 2.1% of respondents claiming no adoption at an organisational level.

In terms of individual characteristics, practitioners have a more positive *attitude to research* than both clinical and non-clinical managers, and clinical managers score significantly higher than their non-clinical managers on this variable. In terms of *need for complexity*, there were no significant differences in this variable between these sub-groups. This suggests that it is a relatively fixed aspect of the individual's personality, rather than something that develops as a result of increased *research seeking* or *research utilisation*, unlike one's *attitude to* *research.* This is important as it is hypothesised that *need for cognition* will predict *attitude to research*, and potentially identify the latter. There were no differences in *aspiration* levels between clinical managers, clinical practitioners and non-clinical managers on any of the items related to this construct. Nor did the groups show any significant differences with respect to *educational level* attained. Surprisingly, there was no difference in *critical appraisal skills* between the clinical management group and their non-clinical colleagues, although clinical practitioners had significantly higher skill levels than non-practitioners. Practitioners were also significantly more likely to believe that they possessed the necessary skills. Clinical managers and clinical practitioners undertake significantly more *CPD* than their non-clinical colleagues.

Turning to environmental factors, when I considered the construct of organisational learning climate I found that clinical practitioners (although not clinical managers), were significantly more likely to report working in a supportive learning climate. There were no differences in the *managerial influencing styles* reported by any of these sub-groups. Clinical and non-clinical managers do not differ in their beliefs about whether they have the *time* to review research evidence, but there is a significant difference in the two groups about whether they have the *authority* to use research evidence in their work. The clinical managers are significantly more likely to believe they have this authority. This is surprising as the average grade of the non-clinical managers is higher than that of their clinical colleagues. Clinical practitioners are significantly more likely to believe that they have time to review research evidence and locate and access this evidence, but there is no difference in their beliefs about their *authority* to implement research evidence when compared with their colleagues. Again, this is unexpected as clinical practitioners are in lower-graded posts than their colleagues.

In terms of role characteristics, clinical managers were more likely to report taking more strategic decisions in their work, despite the fact that they were generally in lower-graded posts.

7.1.2 High CPD and low CPD

Findings from the survey

People who undertake higher levels of *CPD* (i.e. over 7 days a year) are more likely to seek out research evidence, and to utilise that evidence in their work, (including the *political use of research evidence*). They also report a higher level of *adoption of evidence-based practice* and were more likely to believe that they were *encouraged* to engage in this activity as well as reporting higher levels of *improvements* as a result of *engaging in evidence-based practice.*

Those who undertake higher levels of *CPD* have a significantly more positive *attitude to research*, and scored higher on all items related to *aspirations.* They also reported significantly higher *critical appraisal skill levels* as well as being more likely to believe that they possessed the necessary skills to appraise research evidence.

In terms of environmental factors, people who undertook higher levels of *CPD* were less likely to report that their line managers had a *threatening and demanding influencing style*, and believed they worked in a more supportive *organisational learning climate*. They were also more likely to believe that they have *time* to review research evidence and locate and access this evidence. In terms of role characteristics, those who undertook higher levels of *CPD* were also more likely to take strategic decisions, despite the fact that their grades were no higher than those of people who undertook lower levels of *CPD.*

7.1.3 High grade and low grade

Findings from the survey

There were no differences between high and lower grade groups in the amount of *research seeking, research utilisation undertaken, evidence-based practice,* or *political utilisation of research evidence.* Nor were there any differences between the groups when I considered the extent to which they believed they were encouraged to *adopt an evidence-based approach.*

Those in higher graded posts did not demonstrate any significant differences in terms of their *attitude to research*, although those in higher grades did score significantly higher in their *need for complexity* and had attained a higher level of *educational qualifications.* Despite this, there was no difference in *critical appraisal skills* between those in higher and lower-graded posts, nor was there a difference in the extent to which they believe they have the requisite skills to appraise research evidence. Grade had no relationship with the amount of *CPD* undertaken.

When I considered the construct of *organisational learning climate* I found that those in higher graded posts were significantly more likely to report working in a supportive learning climate. Those in higher graded posts were significantly more likely to believe that their *line managers' influencing style* was generally more supportive, involving significantly more 'consultation' and 'rational persuasion', and less likely to believe their style involved 'pressure' and 'inspirational appeals.' Higher graded posts, unsurprisingly, feel they have more *authority* to use research evidence in their work, but did not differ in their responses from their lower-graded colleagues regarding the amount of *time* they had to review research evidence, or their ability to access and review this evidence.

7.1.4 CASP trained and non-CASP trained

Findings from the survey

People who have undertaken the CASP training programme seek out and utilise research evidence more frequently than those who have not received CASP training. They were significantly more likely to believe that they were encouraged to engage in evidence-based practice than those who had not undergone such training, and did in fact engage more frequently in this activity. This is an unsurprising result: one of the aims of the training programme is to encourage research seeking through the development of skills that will enable people to engage in these activities. People who have undertaken the CASP training programme, are significantly more likely to utilise research evidence in their work, but there was no difference when asked about the extent of adoption by either their team or organisation (when compared with the group who had not received CASP training).

Surprisingly, people who have undergone CASP training do not have a more positive *attitude to research* than those who have not. In terms of *need for complexity*, there were no significant differences in this variable between the groups. Nor was CASP training related to higher levels of *aspirations*, despite the fact that the CASP group had a significantly higher level of *educational qualifications* than their colleagues and undertakes significantly more *CPD.* Those who had undergone CASP training did score significantly higher with respect to their *critical appraisal skills*, and were also significantly more likely to believe that they possessed the necessary skills to *engage in evidence-based practice.*

They do not differ on any of the items related to *extrinsic PBC (time, access, authority)* from their colleagues who have not experienced such training, nor were they any more likely to report that they were working in an *organisational climate* that is supportive of learning.

7.1.5 ***Variables that had no significant differences between the sub-groups considered:***

i Years experience in role

ii Rewarded for adopting an evidence-based approach to practice.

Iii Promotion linked to research expertise.

7.2 The Hypotheses - Group differences.

It would seem that most attempts to influence *research seeking*, *utilisation* and *evidence-based practice* have their effects via *attitude to research*, although the need to conform and to benefit from this conformity will influence behaviour directly.

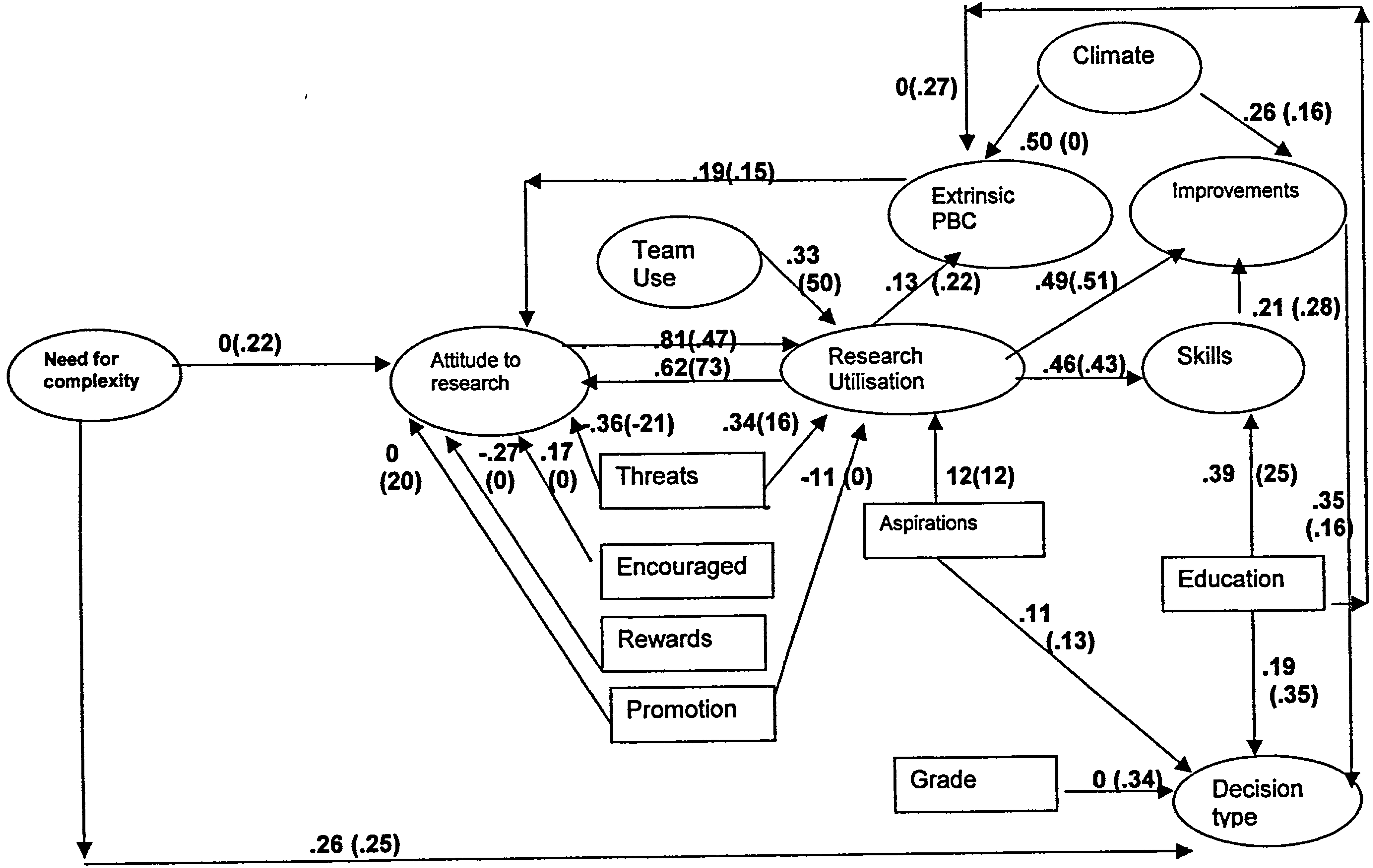
Note that it will not be possible to consider the full model with respect to the sub-groups 'CASP trained' and 'clinical practitioners', as the poor sample size to parameter ratios could make the results unstable.

The hypotheses:

The earlier models demonstrate that some of the variables will have a direct impact on *attitude to research*. Whilst I am expecting that the structural model will be well fitting for all sub-groups, I am predicting that there will be significant differences in the regression weights when these groups are compared. (i.e. the sense-making process will be critical in determining the direction and effect of the variables).

Each of the sub-groups will now be compared in the models that follow. I shall consider the behaviours (*research utilisation, research seeking,* and *evidence-based practice*) in turn, starting with *research utilisation.*

Figure 7.1 : *RESEARCH UTILISATION* **The nonrecursive model – Clinical and Non-Clinical Managers**



(non-clinical scores in parentheses)

Clinical Managers

Chi-square = 81.039

Degrees of freedom = 72

Probability level = 0.218

GFI .94 IFI .96

RMSEA .00-.056

Hoelter 196

Stability index .425

Non-clinical Managers

Chi-square = 84.014

Degrees of freedom = 72

Probability level = 0.157

GFI .96 IFI .99

RMSEA .00 -.047

Hoelter 267

Stability index .205

Experience was not a significant predictor of *research utilisation* or *attitude to research* in either group, and was therefore not included in the above model. Note that *encouraged* and *rewarded* were necessary to identify *attitude to research* in the clinical management group, where *need for complexity* was not a significant predictor.

Significant differences between the two groups (critical ratio >1.96)

Need for complexity to *attitude to research*

Education level to *critical appraisal skills*

Organisational learning climate to *extrinsic PBC*

Grade to *decision type*

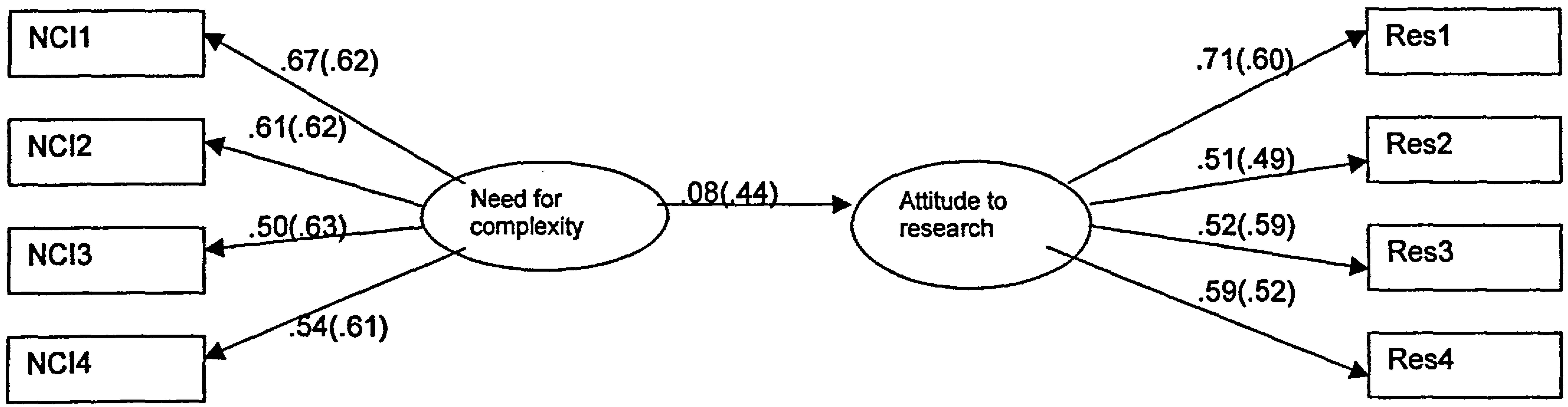
Education to *decision type*

Attitude to research to *research utilisation*

Threatening/demanding management style to *research utilisation*

Where possible I have replicated the group differences in smaller unparcelled recursive models to ensure that these are true differences and not measurement artifacts arising from parcelling or a too low sample size to parameter ratio.

Figure 7.2 *The reduced recursive model – Research utilisation Clinical and Non-clinical Managers. Need for complexity to attitude to research*



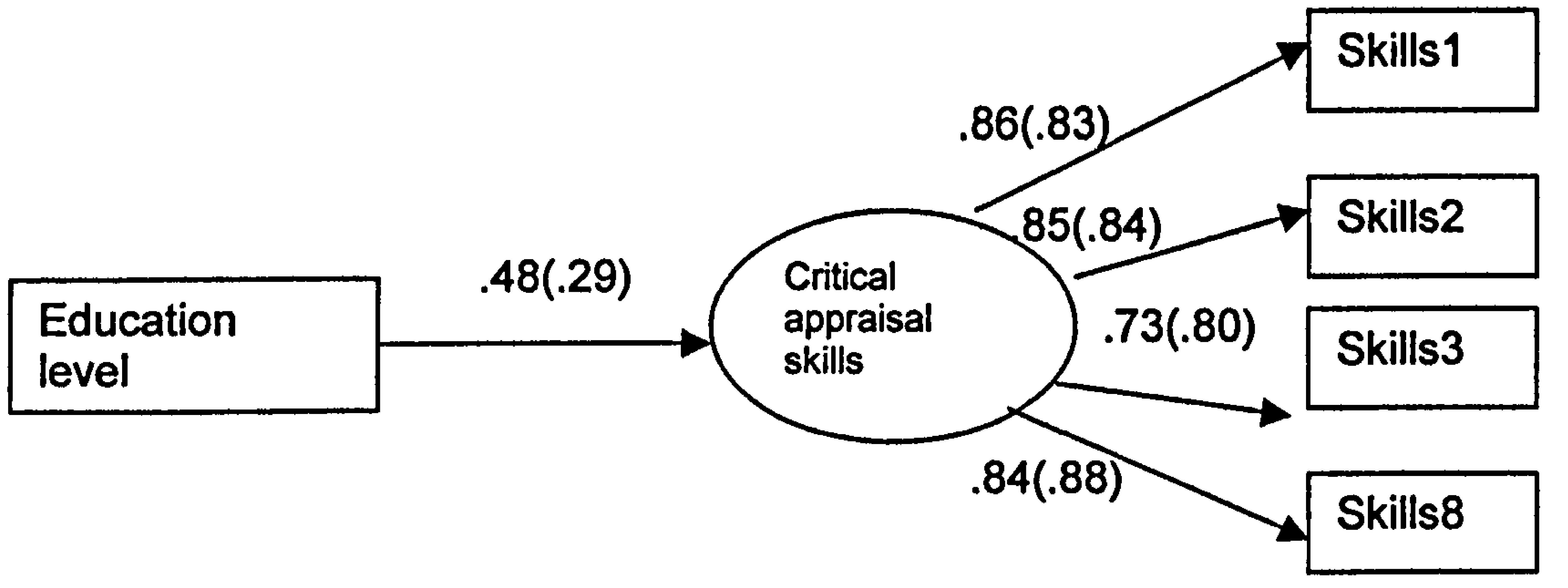
(Unstandardised parameter weight: clinical =.05 non-clinical = .22) Significantly different (p.05)

Chi-square = 25.382

Degrees of freedom = 38

Probability level = 0.942

Figure 7.3 *The reduced recursive model – Research utilisation. Clinical and Non-clinical Managers. Education to critical appraisal skills*



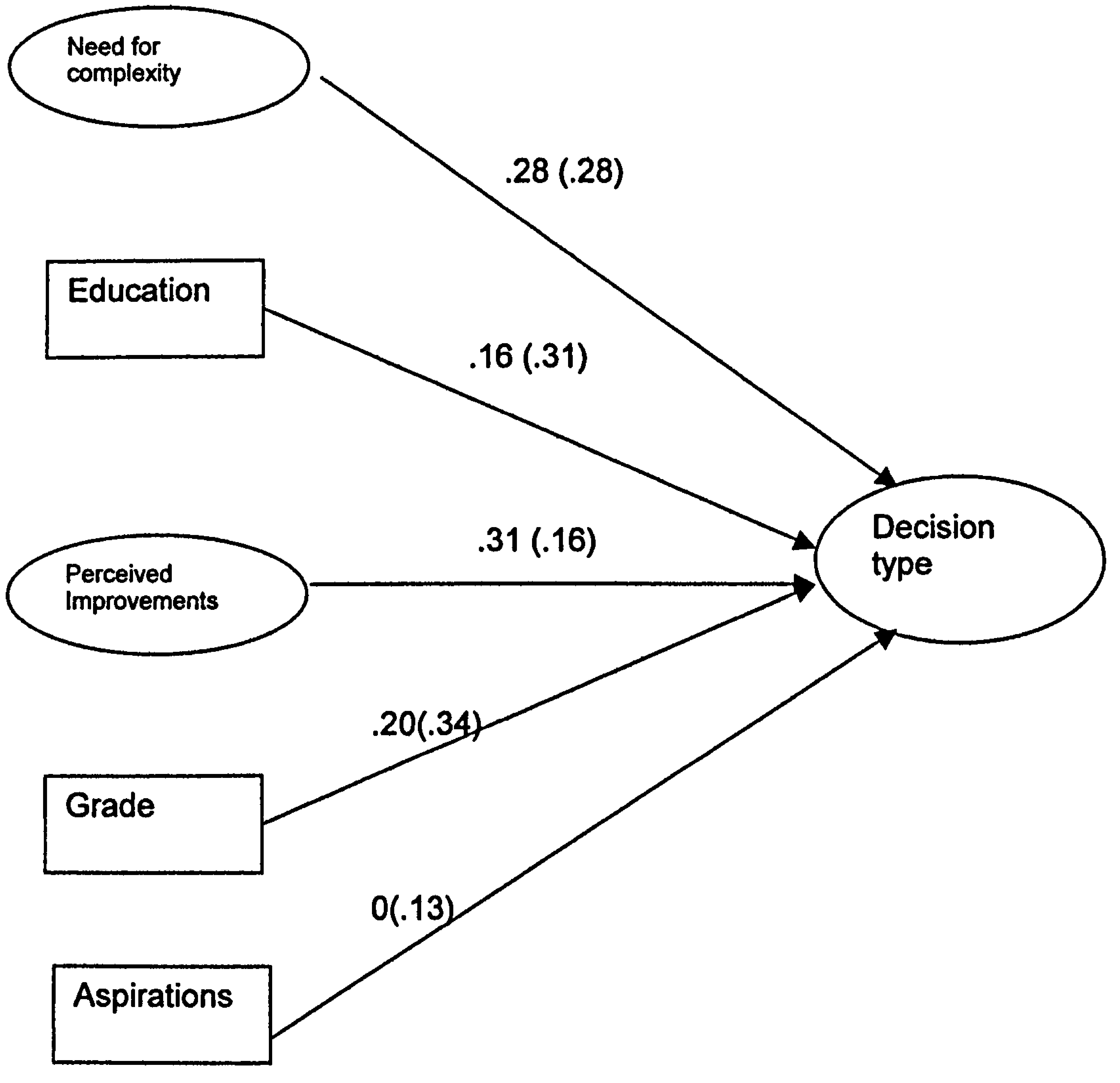
(Unstandardised parameter weight: clinical =.22 non-clinical = .13)

There is a significant difference between the two groups, with *education* being far more likely to lead to the development of the *critical appraisal skills* required for *research utilisation* in the clinical management group

A supportive *organisational learning climate* also had a significantly stronger impact on *extrinsic PBC* in the clinical management group in the recursive model.

	Clinical Managers	Non-clinical managers
Regression weights		
Standardised	.50	0
Unstandardised	.74	11

Figure 7.4 *The reduced recursive model – Research utilisation Clinical and Non-clinical Managers. Predictors of decision type*



(non-clinical management scores in parentheses)

Chi-square = 171.648

Degrees of freedom = 156

Probability level = 0.185

GFI .95 IFI .99

RMSEA .00 -.029

Hoelter 450

The full model was tested, as evidenced by the fit measures above, although in the interests of simplifying the diagram, only the main constructs are shown, as the measurement models within it have already been analysed.

Grade and *education* are both significantly stronger predictors of *decision type* in the non-clinical management group.

The unstandardised regression weights from *education* to *decision type*:

Clinical managers .02

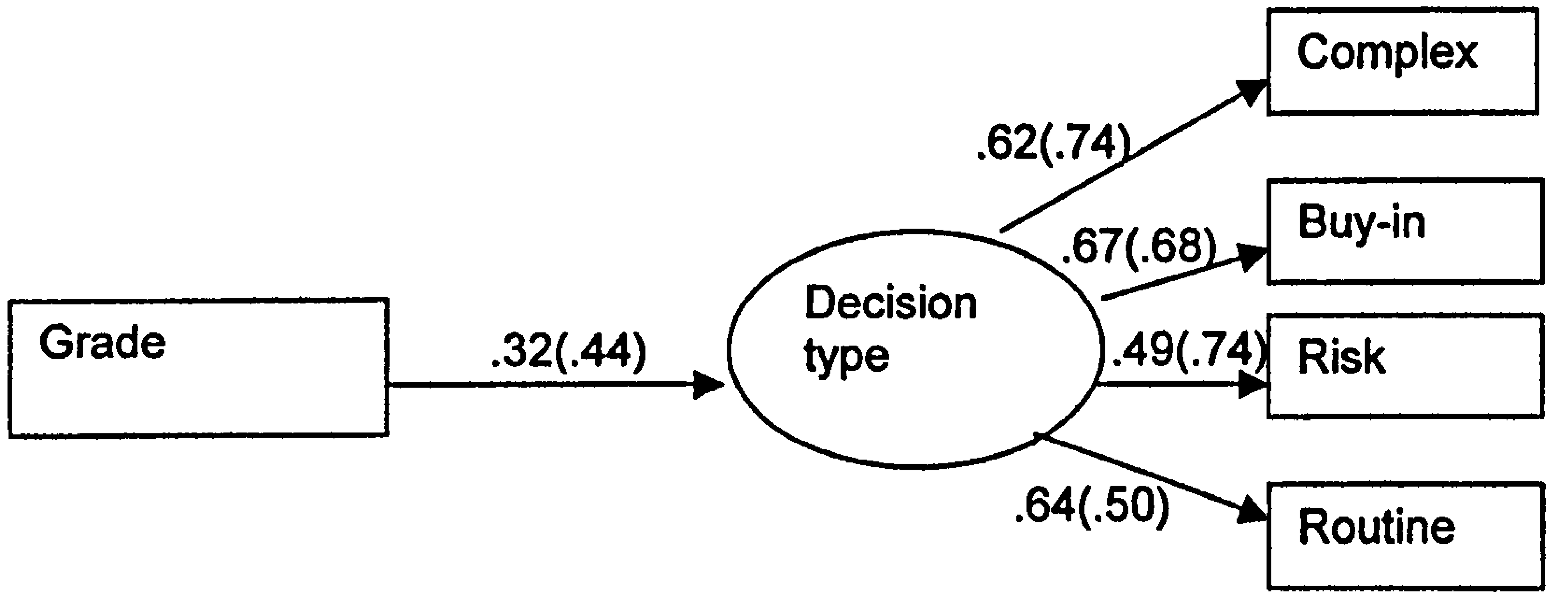
Non-clinical managers .08

The unstandardised regression weights from *grade* to *decision type*:

Clinical managers .05

Non-clinical managers .16

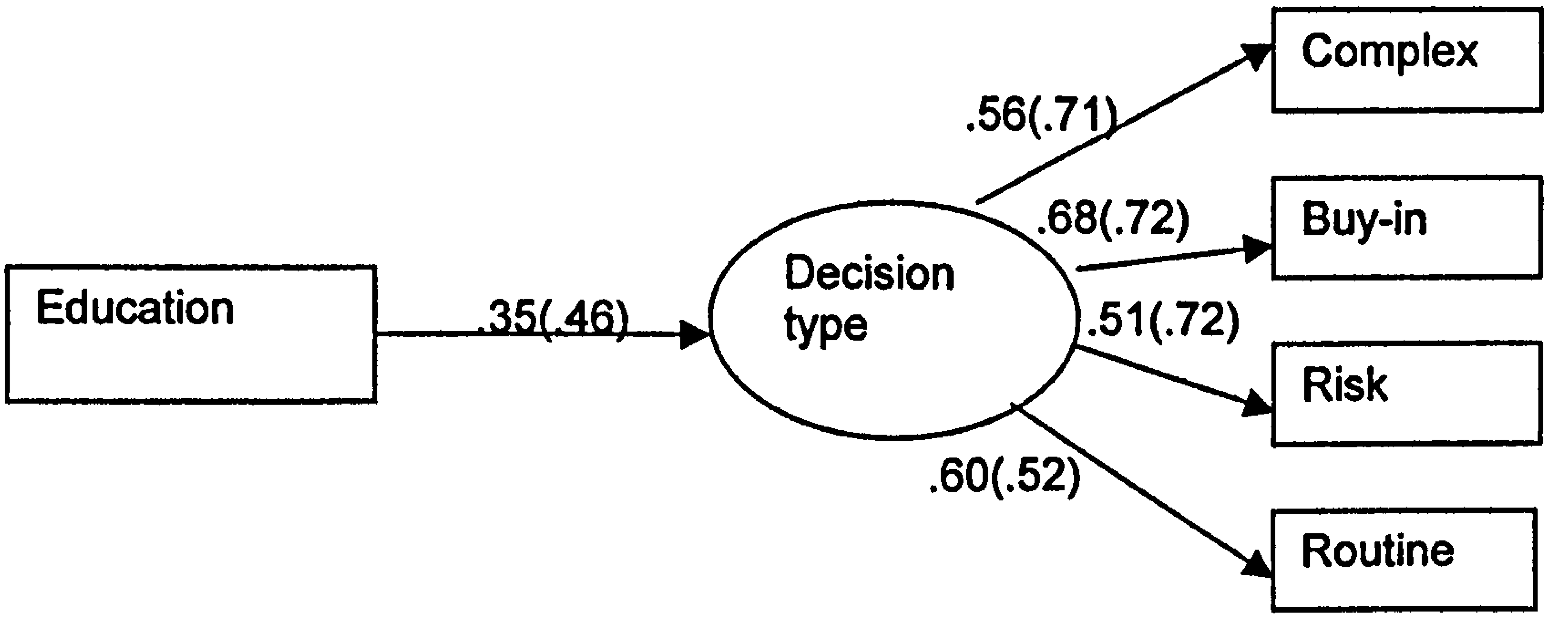
Figure 7.5 *The reduced recursive model – Research utilisation Clinical and Non-clinical Managers. Grade to decision type*



(Unstandardised parameter weight: clinical =.10 non-clinical = .21)

Grade is a significantly more important predictor of *decision type* in the non-clinical management group.

Figure 7.6 *The reduced recursive model – Research utilisation Clinical and Non-clinical Managers. Education to decision type*

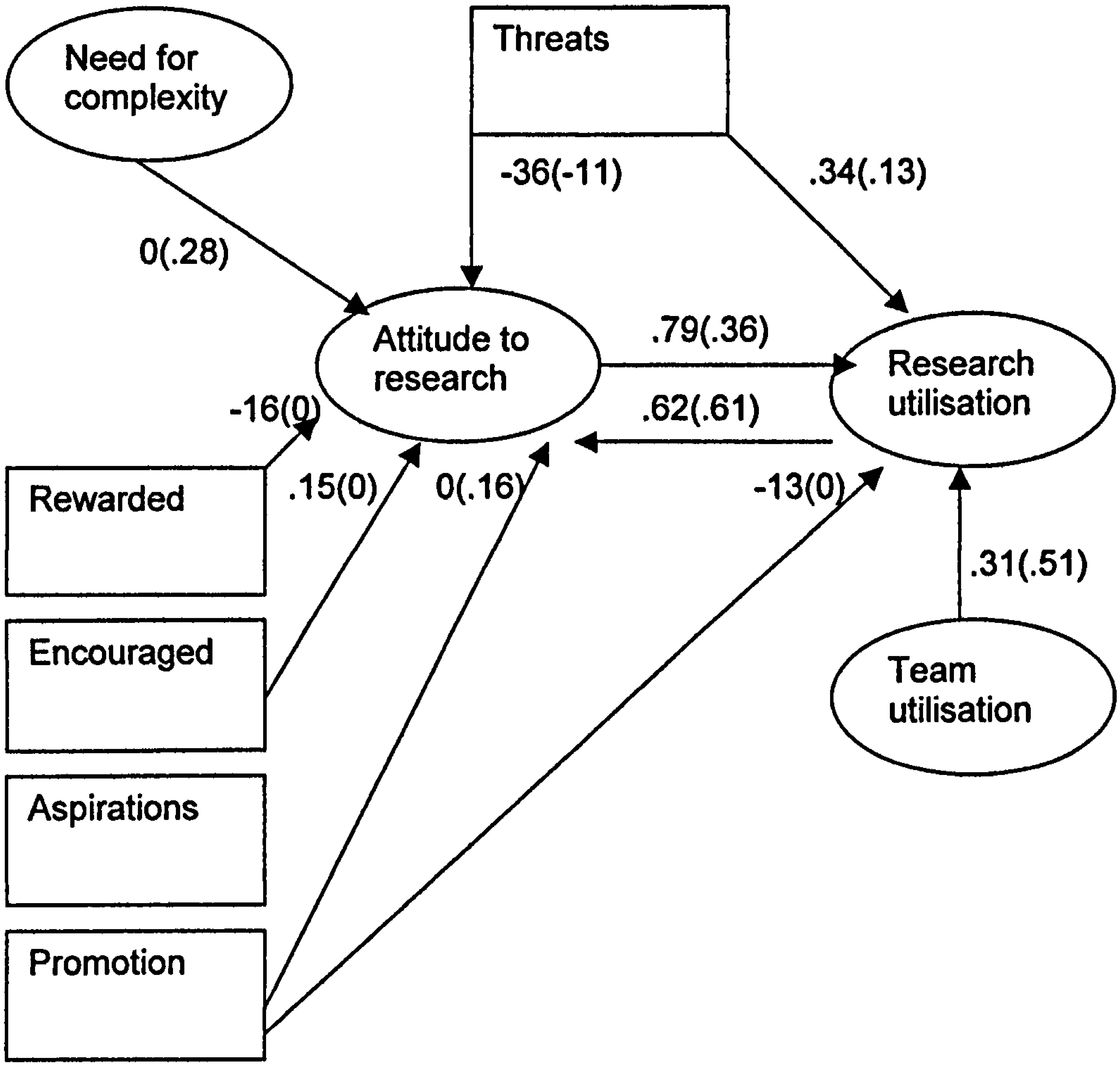


(Unstandardised parameter weight: clinical =.05 non-clinical = .12)

Education is a significantly more important predictor of *decision type* in the non-clinical management group.

In order to test those variables within the feedback loop it was necessary to develop a smaller model with both *attitude to research* and *research utilisation* identified, to see if the differences between the groups still held true in the smaller, unparcelled model. The full model was tested, as evidenced by the fit measures below, although again, in the interests of simplifying the diagram, only the main constructs are shown.

Figure 7.7 *The reduced recursive model – Research utilisation Clinical and Non-clinical Managers.*



(Non-clinical managers scores are shown in parentheses)

Clinical Managers

Chi-square = 112.071

Degrees of freedom = 105

Probability level = 0.300

Non-clinical Managers

Chi-square = 125.142

Degrees of freedom = 105

Probability level = 0.088

Both unparcelled models are still well fitting. In terms of the expected group differences, we know already that *need for complexity* is significantly different between the groups, and, in the above model, *attitude to research* to *research utilisation* also shows a significant difference, as does a *threatening and demanding management style* to *research utilisation.*

Unstandardised regression weights	*Clinical*	*Non-clinical*
Threats to *research utilisation*	.17	.07
Attitude to research to *research utilisation*	.96	.32

These differences would not have been apparent had a nonrecursive model not been employed. We find that the differences found in the nonrecursive models still hold true in the recursive models when they are not part of the feedback loops. Where they are, however, the differences are not apparent until a nonrecursive model is employed.

7.3 <u>The findings with respect to research utilisation</u>

Attitude to research to *research utilisation* is, as predicted, far stronger in the clinical group where, because the history of research based decision making is far longer in this group, there are greater opportunities and support available to translate one's personal preferences into action. However, *team utilisation of research* to *individual research utilisation* is not significantly different between the groups. Despite the apparent differences in the parameter weights, the critical ratio is just under 1.96.

Again, as predicted, a *threatening and demanding management style* (which is negatively correlated with a supportive *organisational learning climate*) does have a direct positive impact on *research utilisation*. This management style has, however, a negative impact on *attitude to research*, although there are no significant differences in this parameter weight between the two groups compared.

People will make an assessment about the likelihood of sanctions if they fail to engage in the behaviour; at the same time they make an evaluation about why the use of threats is necessary. A reasonable assumption would be because the behaviour itself is not intrinsically motivating, and this in turn will have a negative effect on one's attitude to that behaviour. It may, on the other hand, simply be the case that one resents being forced to engage in any behaviour, and that behaviour then becomes automatically less appealing. It is to be expected that this management style will have a stronger impact on *research utilisation* in the clinical management group, as it is an environment where they have a stronger desire to encourage this behaviour – and for some managers this will involve 'encouragement' through threats and demands. There is certainly reason to believe that as the expectation of research (or evidence) utilisation grows in the non-clinical environment, this difference between the groups will disappear.

As predicted, aspirations for *promotion*, does impact *research utilisation* directly, albeit rather weakly. If one believes that one will be rewarded for engaging in a given behaviour, and this is a desired reward, then there is no need to alter one's view about the behaviour in question in order to engage in it. It does not, however, explain a great deal of the variance for either group. I had expected that the regression weight would be higher in the clinical management group, but it does not appear to be the case (as I had assumed) that *promotion* is any more likely to be related to *research utilisation* in the clinical management group than it is in the non-clinical group.

Encouragement does appear to generate a positive *attitude to research*, at least in the clinical management group. We know from reward theory that positive verbal encouragement frequently has a positive effect on one's intrinsic motivation and therefore the likelihood of engaging in that behaviour. On the other hand, extrinsic rewards can have a negative effect on motivation if handled incorrectly, for example, if the individual feels that the objectives they need to achieve to obtain the rewards are not within their control. It is difficult to know whether the *rewards* are reducing intrinsic motivation (as they provide external justification for the behaviour) or whether the *rewards* are failing to promote *research utilisation* because there is felt to be a lack of procedural justice in the way they are administered. It was surprising to find that clinical managers and clinical practitioners felt no more or less *rewarded* for their awareness and use of research evidence than their non-clinical colleagues. It would seem that there is more that could be done to link rewards to desired behaviours, although caution must be exercised in the way this is applied in practice.

I had predicted that *need for complexity* would be a predictor of *attitude to research*, particularly in the non-clinical management group. We know from twin studies that inherent characteristics and preferences can influence attitude formation under certain circumstances i.e. where the attitudes are judged to be socially acceptable and/or there is opportunity to engage in the behaviour towards which one is intrinsically motivated. Personality factors would appear, however, to become less important in predicting behaviour as an individual's direct exposure to that behaviour, and its consequences, increases.

Research utilisation is a moderate to high predictor of *critical appraisal skills* for both clinical and non-clinical management groups. The Theory of Planned Behaviour would not ordinarily consider that the relationship could be reciprocal, or the strength of those reciprocal regression weights. Once respondents have developed these skills they are far more likely to generate improvements (from research utilisation) as a result of this improved skill level. Surprisingly, higher levels of *critical appraisal skills* was not found to lead to a more positive *attitude to research* or increased *research utilisation* for either the clinical or non-clinical management groups. This does, however, confirm Rich's (2001) findings when he reported that his results revealed that there was little difference between users and non users of scientific research relative to their background in research methodology.

Contrary to previous research, which considered barriers to the adoption of a research based approach, *extrinsic control factors (time, access and authority)* accounted for very little of the variance in *research utilisation*. I had believed that this might be explained by the different methodologies employed (i.e. previous research had generally employed recursive models), but this does not appear to be the case. The key difference is in the inclusion of additional variables (rather than simply considering barriers to *research utilisation*). When other variables are included in the model, the impact of *extrinsic PBC* is greatly reduced. Previous research had also failed to consider the direction of the relationship between *PBC* and *research utilisation.*

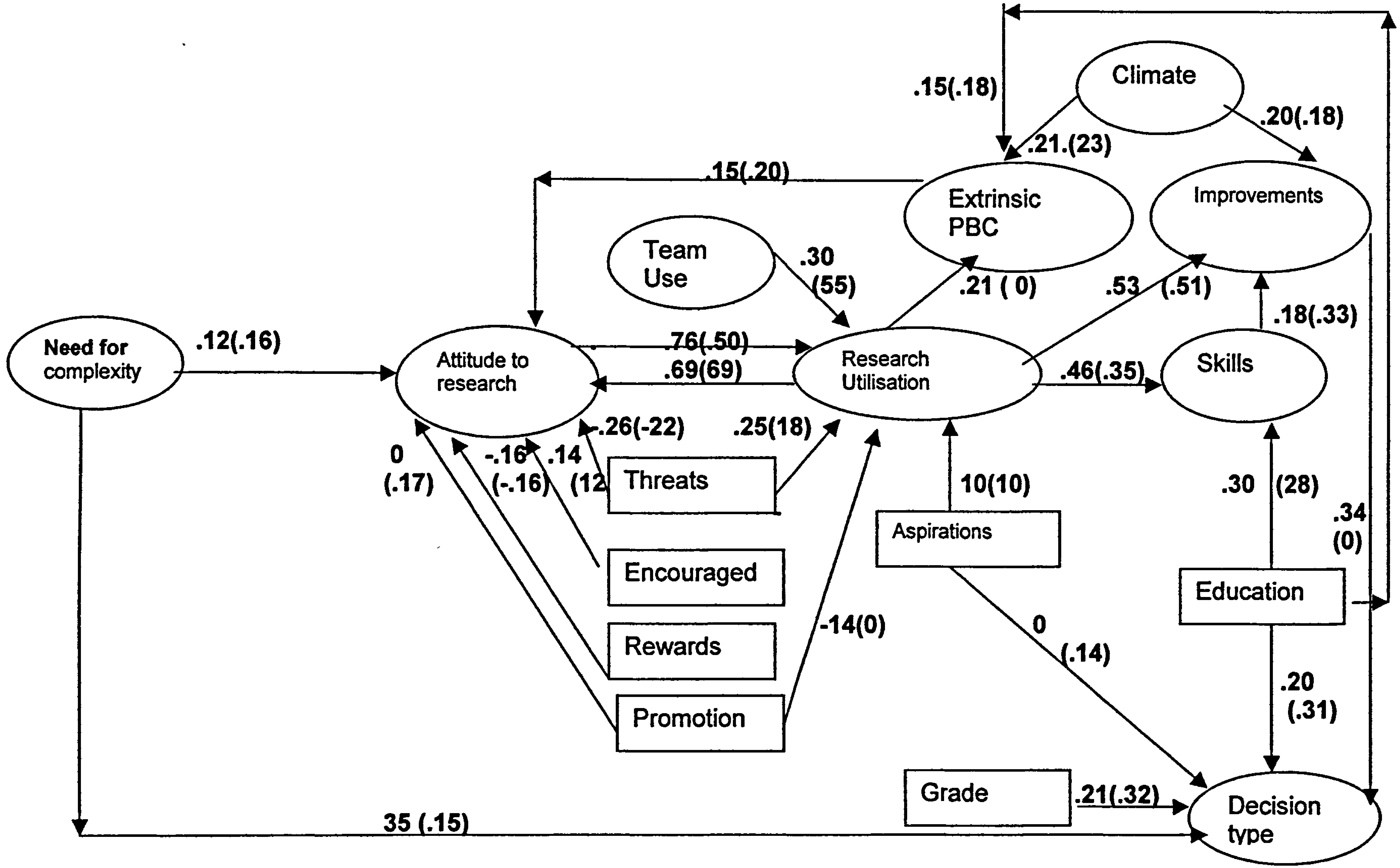
The nonrecursive model enables us to see, as the TPB predicts (but had not previously examined), that *research utilisation* does increase one's sense of mastery over the external environment and, as a result, improves one's *attitude to research*. Its effect on the behaviour (in this case *research utilisation*) is via improving one's *attitude to research*. Perhaps the more one believes one will be unsuccessful in an endeavour, the more one adopts a negative attitude as if to justify one's avoidance of the behaviour. Alternatively, the more one believes one is likely to succeed, the more positive the attitude, as success will lead, one imagines, to feelings of increased self-efficacy.

It is puzzling why *promotion* should have a positive relationship with *attitude to research* in the non-clinical management group. This is different to the relationship one finds when one considers the impact of *extrinsic rewards* more generally on *attitude to research*: yet *promotion* could conceivably be regarded as one form of extrinsic reward. It may be that there are less tangible aspects of promotion (i.e. those other than pay and benefits), such as acknowledgement of one's expertise, which impact upon respondents' attitude towards the behaviour, thereby increasing intrinsic motivation.

Perceived improvements, as discussed earlier, did not lead to an improved *attitude to research* in either the clinical or non-clinical management groups. This may be a result of the way in which the questions were phrased. I did find, however, that *perceived improvements* arising out of *research utilisation* did have a significant impact on the extent to which people took strategic decisions in their work, even having controlled for other variables. The inclusion of this relationship in the model meant that there was now no direct relationship between *research utilisation* and *decision type*, its impact having been via *perceived improvements* arising out of that behaviour.

Whilst *decision type* did not predict any additional variance in *research utilisation*, I did gain an appreciation of those factors that encouraged more strategic decision making. Even when we control for *grade* and *education*, *perceived improvements* arising out of *research utilisation* is able to predict some of the variance in *decision type*, as are *need for complexity* and *critical appraisal skills.* Where *research utilisation* is lower (i.e. in the non-clinical management group), *grade* and *education* become far more important predictors of *decision type.*

Figure 7.8 : *RESEARCH UTILISATION* The nonrecursive model – High v low CPD (Low CPD scores in parentheses)



High CPD

Chi-square = 87.406

Degrees of freedom = 72

Probability level = 0.104

GFI .95 IFI .98

RMSEA .00 -.054

Hoelter 216

Stability index .398

Low CPD

Chi-square = 87.120

Degrees of freedom = 72

Probability level = 0.108

GFI .95 IFI .98

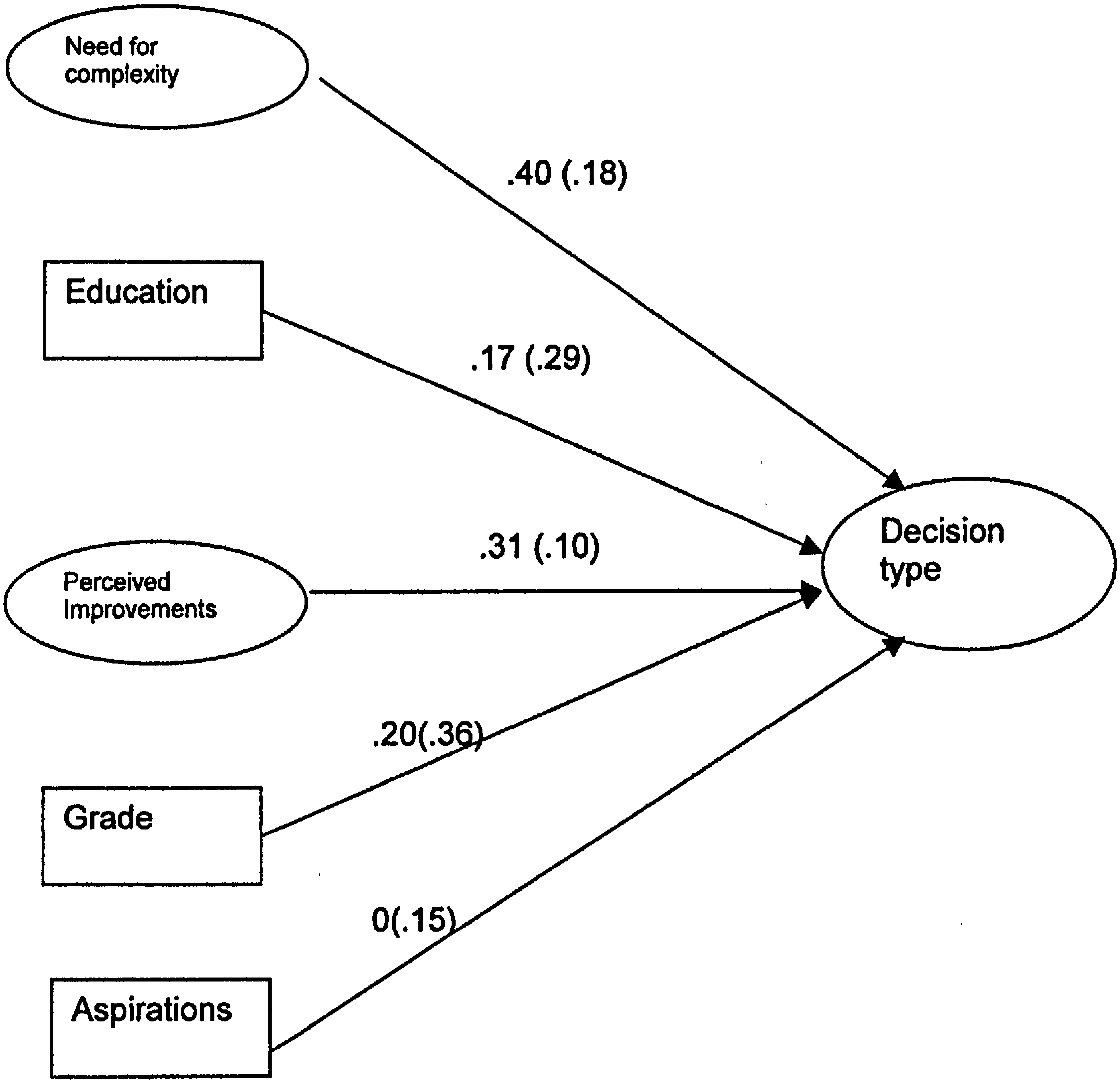
RMSEA .00 - .55

Hoelter 209

Stability index .234

In this model only the parameter weight from *grade* to *decision type* is significantly different between the groups. As before, I tested the relationship in a smaller, unparcelled, model.

Figure 7.9 *The reduced recursive model – Research utilisation High and low CPD groups. Predictors of decision type.*



Again, the full model was tested.

(Low CPD scores in parentheses)

Chi-square = 190.464

Degrees of freedom = 156

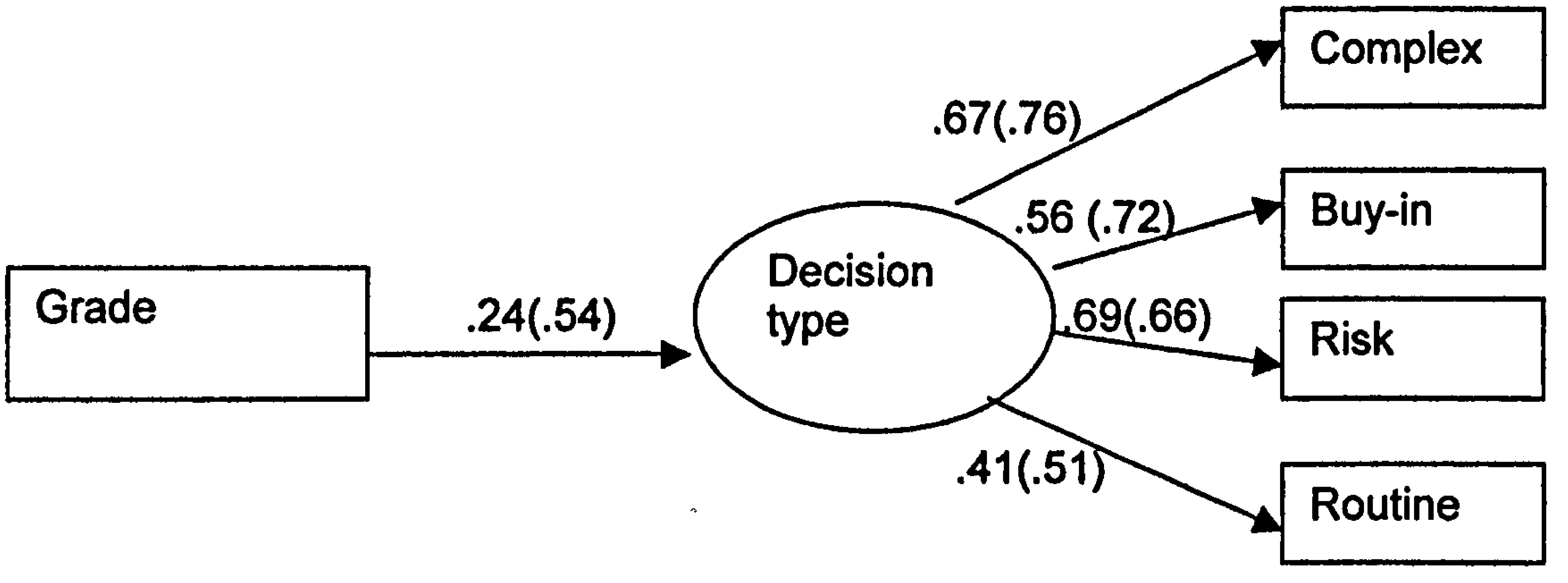
Probability level = 0.031

GFI .93 IFI .99

RMSEA .00 -.034

Hoelter 391

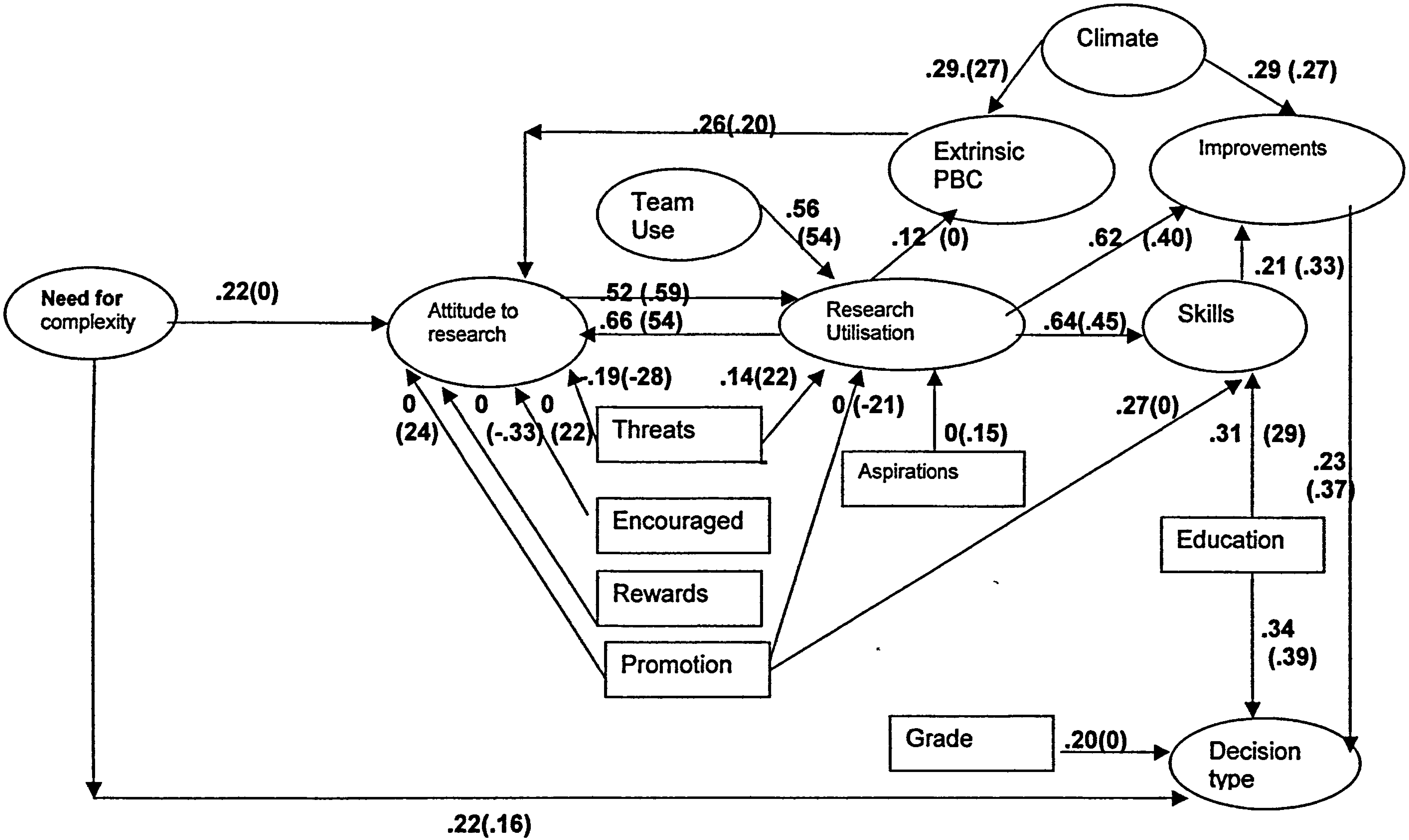
Figure 7.10 *The reduced recursive model – Research utilisation High and low CPD groups. Grade to decision type.*



(Unstandardised parameter weight: High CPD =.07 Low CPD = .17)

Again, in the unparcelled model, *grade* to *decision type* is the only parameter that shows significant differences between the two groups in the above model.

Figure 7.11: *RESEARCH UTILISATION* The nonrecursive model – Grade (low grades in parentheses)



The modification index suggests a path from *promotion* linked to research expertise to the development of *critical appraisal skills*, which can be justified theoretically.

High Grade

Chi-square = 110.160

Degrees of freedom = 70

Probability level = 0.002

GFI .94 IFI .95

RMSEA .033-.06

Hoelter 196

Stability index .203

Low Grade

Chi-square = 91.842

Degrees of freedom = 70

Probability level = 0.041

GFI .92 IFI .96

RMSEA .02-.07

Hoelter 195

Stability index .117

There are significant differences between the two groups:

Need for complexity to *attitude to research*

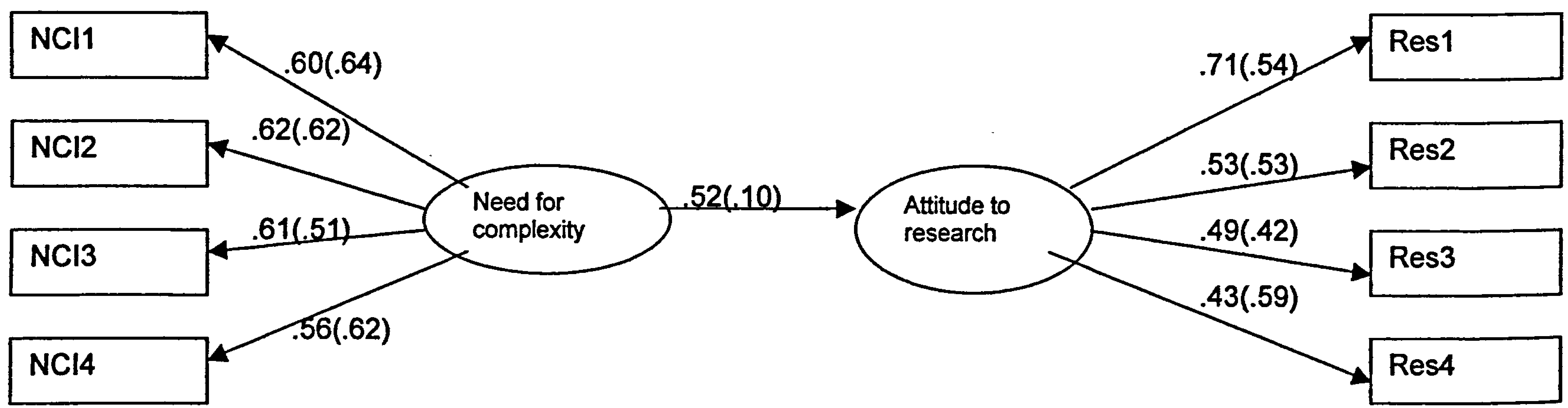
Reward to *attitude to research*

Research utilisation to *perceived improvements*

Promotion to *critical appraisal skills*

The recursive models:

Figure 7.12 *The reduced recursive model – Research utilisation. High and low grade groups. Need for complexity to attitude to research*



Chi-square = 33.923

Degrees of freedom = 38

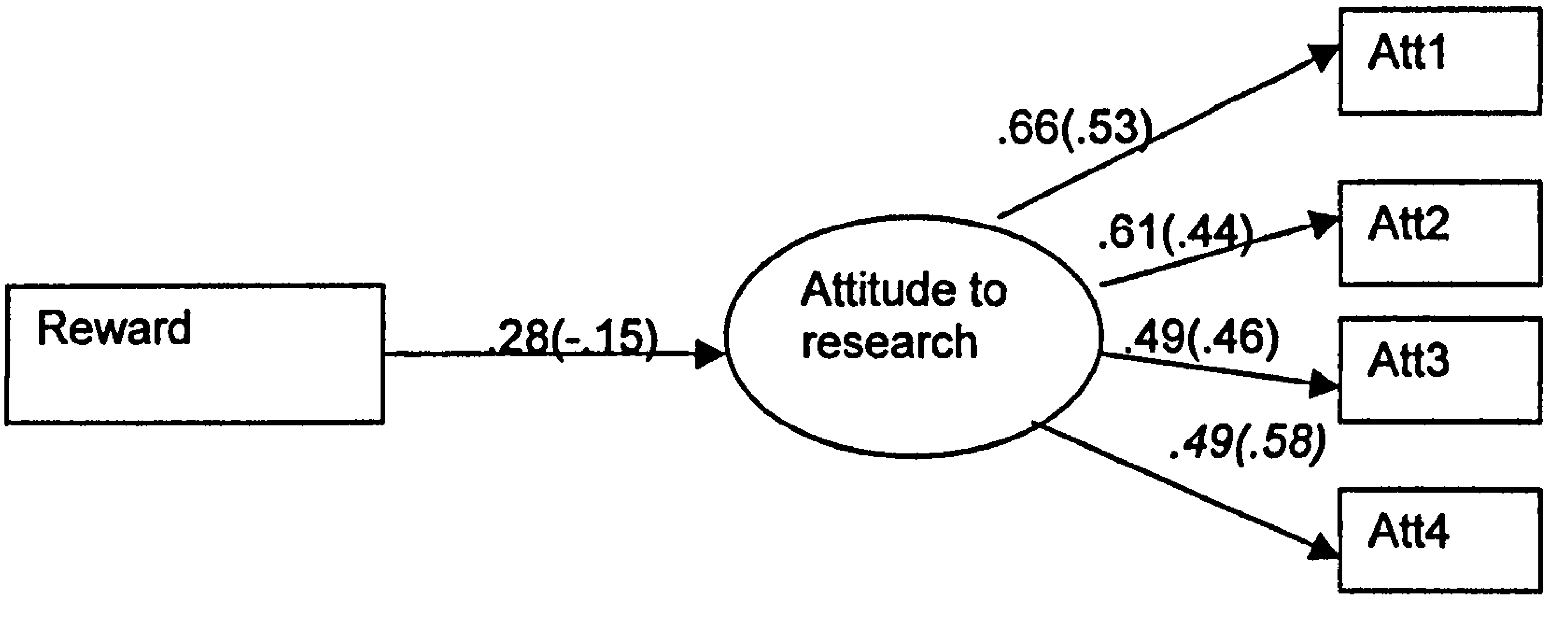
Probability level = 0.658

(Unstandardised parameter weight: high grade =.66 low grade = .11)

The difference between the two groups is significant in the above model.

When one considers the relationship between *reward* and *attitude to research*, one finds that the recursive model behaves quite differently:

Figure 7.13 *The reduced recursive model – Research utilisation. High and low grade groups. Reward to attitude to research*



Chi-square = 4.669

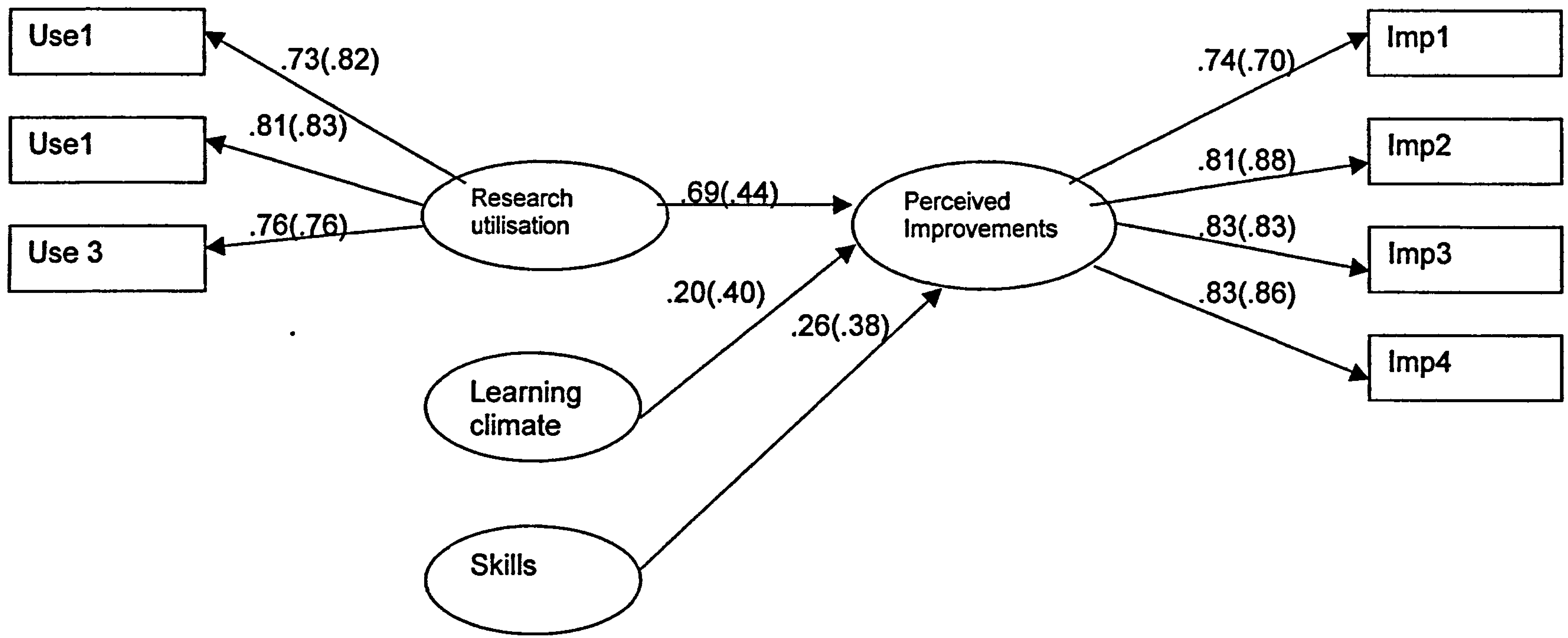
Degrees of freedom = 10

Probability level = 0.912

(Unstandardised parameter weight: High Grade =.22 Low Grade = -.10)

Note that in the recursive model the regression weight from *reward* to *attitude to research* is positive. The differences between the two groups in the recursive model do, however, remain significant. If we had not considered the impact of other variables on *attitude to research* (including the reciprocal relationship this variable has with *research utilisation*), then it could, misleadingly, suggest that *rewards* had a positive impact on *attitude to research* for those people in higher graded posts.

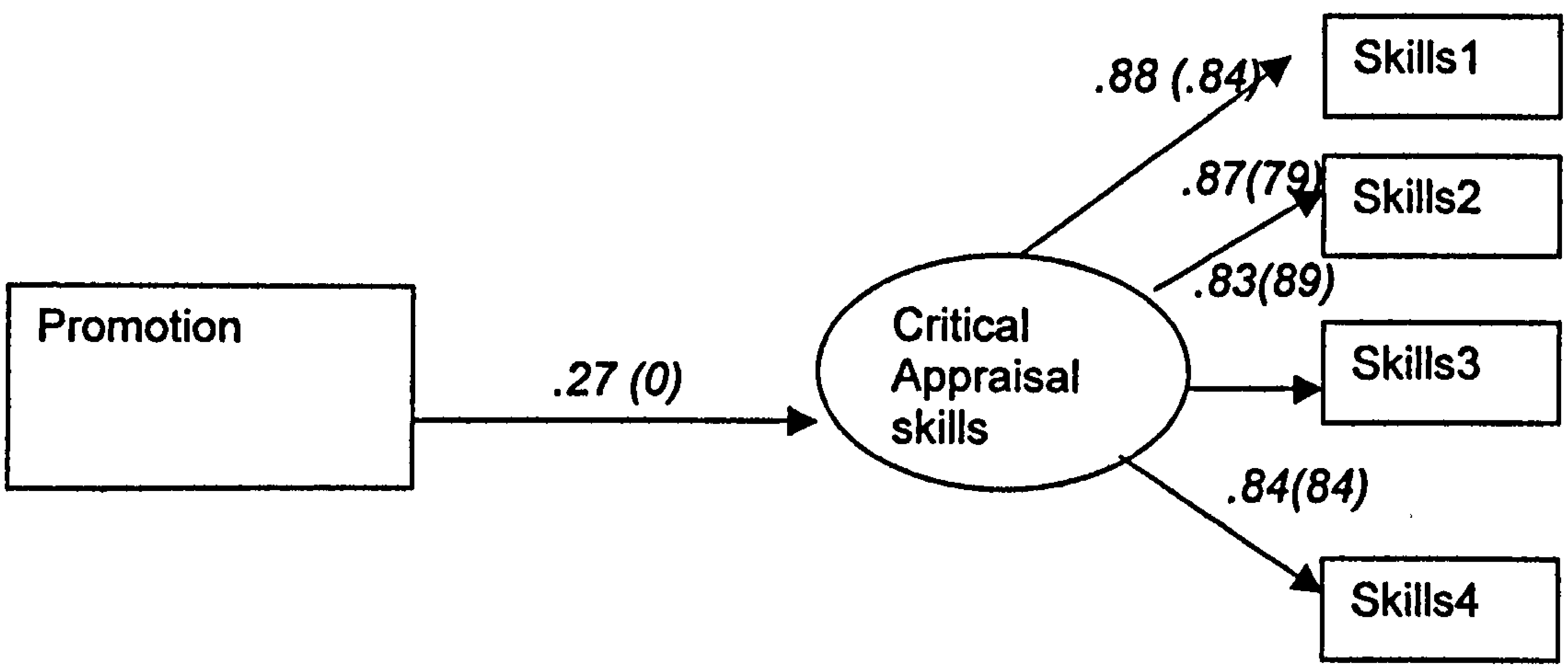
Figure 7.14 *The reduced recursive model – Research utilisation. High and low grade groups. Predictors of perceived improvements.*



(Unstandardised parameter weight: research utilisation to improvements high grade =1.19 low grade = .57)

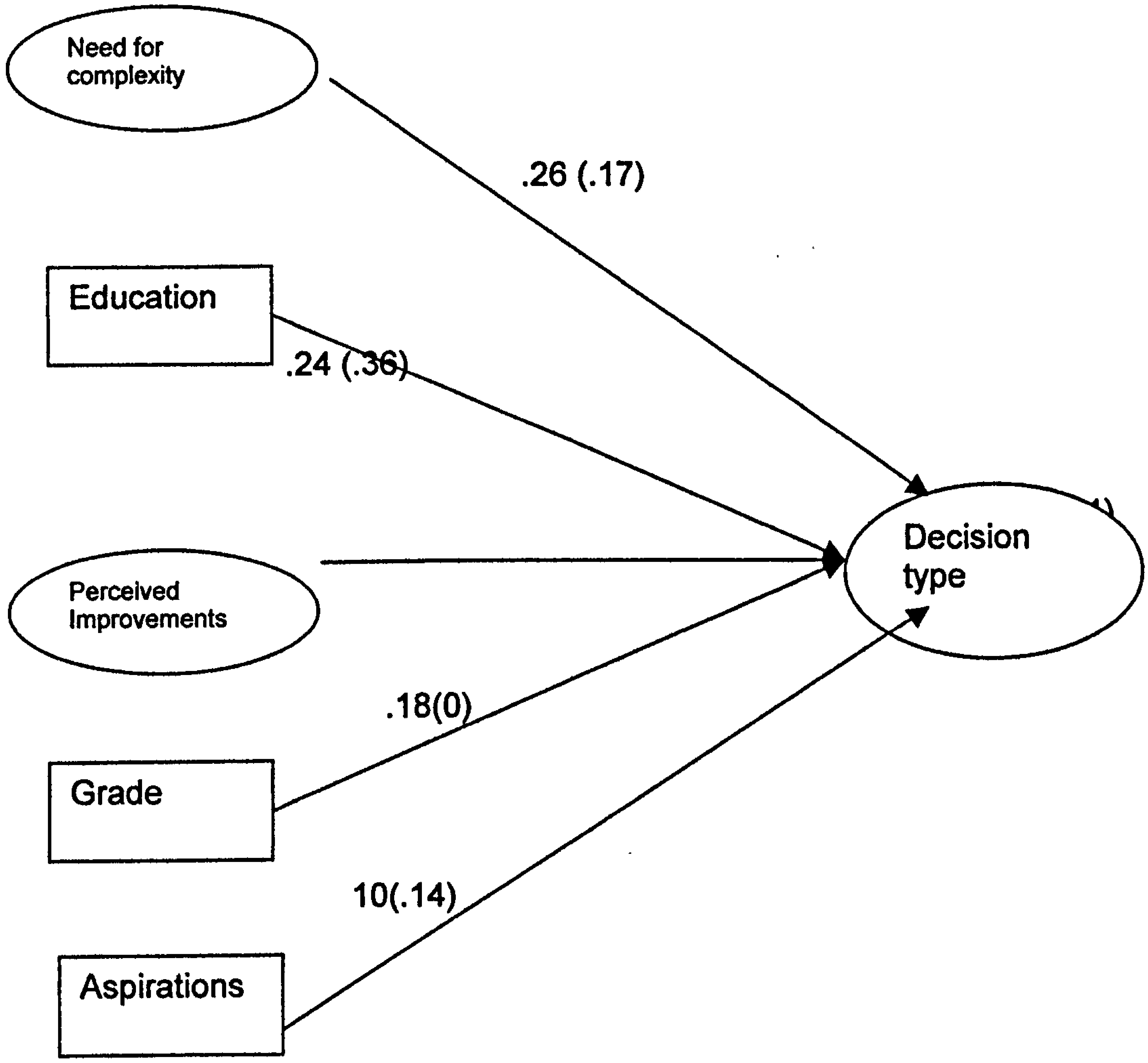
The difference between the two groups is significant in the above model.

Figure 7.15 *The reduced recursive model – Research utilisation. High and low grade groups. Promotion to critical appraisal skills*



(Unstandardised parameter weight: promotion to critical appraisal skills high grade =.25 low grade = 0)

Figure 7.16 The reduced recursive model – Research utilisation. High and low grade groups. Predictors of decision type.



As before, the full model was tested.

(Low grade scores in parentheses)

Chi-square = 176.547

Degrees of freedom = 156

Probability level = 0.124

GFI .93 IFI .99

RMSEA .00 -.034

Hoelter 337

(None of the parameters show significant differences between the two groups in the above model).

<u>7.4 Research seeking</u>

The problem of identification of this model, outlined earlier, illustrates a common problem in nonrecursive structural equation modelling, and perhaps demonstrates why it is not more popular. It is extremely difficult to ensure that the model will be identified when planning one's research. There are frequently no precedents to guide the use of variables that will serve as instruments to the endogenous variables in the model that are hypothesised to have reciprocal relationships.

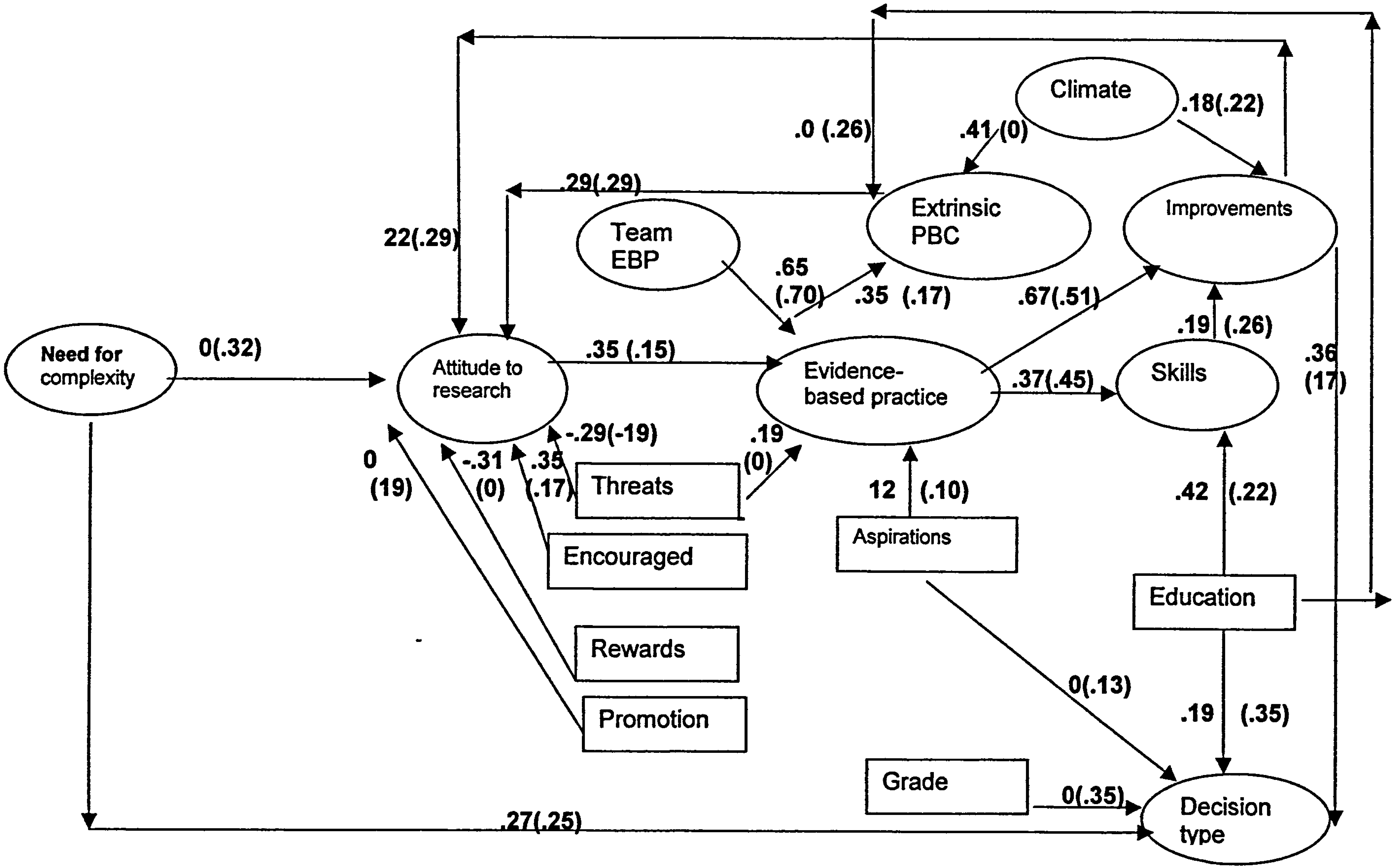
In this instance I was able to use an alternative variable to identify the model, but even then one must check that the separate models of all groups being compared are identified. Although this approach is used infrequently in the literature there are examples of authors overlooking the fact that one (or even both) of the comparison groups' models has not been identified. See for example a recent study by Simpson and Joe (2004).

I found, in this instance, that it was not possible to identify the clinical management group the high CPD group, or the high grade group, as, even having identified *research seeking*, there were no variables in the model that could identify *attitude to research.* They each either impacted on other variables in the feedback loop, or were not significant identifiers of *attitude to research.* This was very frustrating but not uncommon when there is, at present, little to guide the researcher in the social sciences in terms of choosing appropriate identifying variables in the original survey design.

I will now consider the group comparisons with respect to the behaviour *evidence-based practice.*

Page intentionally blank

7.5 Figure 7.17 *EVIDENCE-BASED PRACTICE.* The nonrecursive model Clinical and non-clinical managers



Clinical Managers

Chi-square = 83.525

Degrees of freedom = 73

Probability level = 0.188

GFI .94 IFI .98

RMSEA .00 -.056

Hoelter 194

Stability index .161

Non-clinical Managers

Chi-square = 75.824

Degrees of freedom = 73

Probability level = 0.388

GFI .96 IFI .99

RMSEA .00 -.040

Hoelter 308

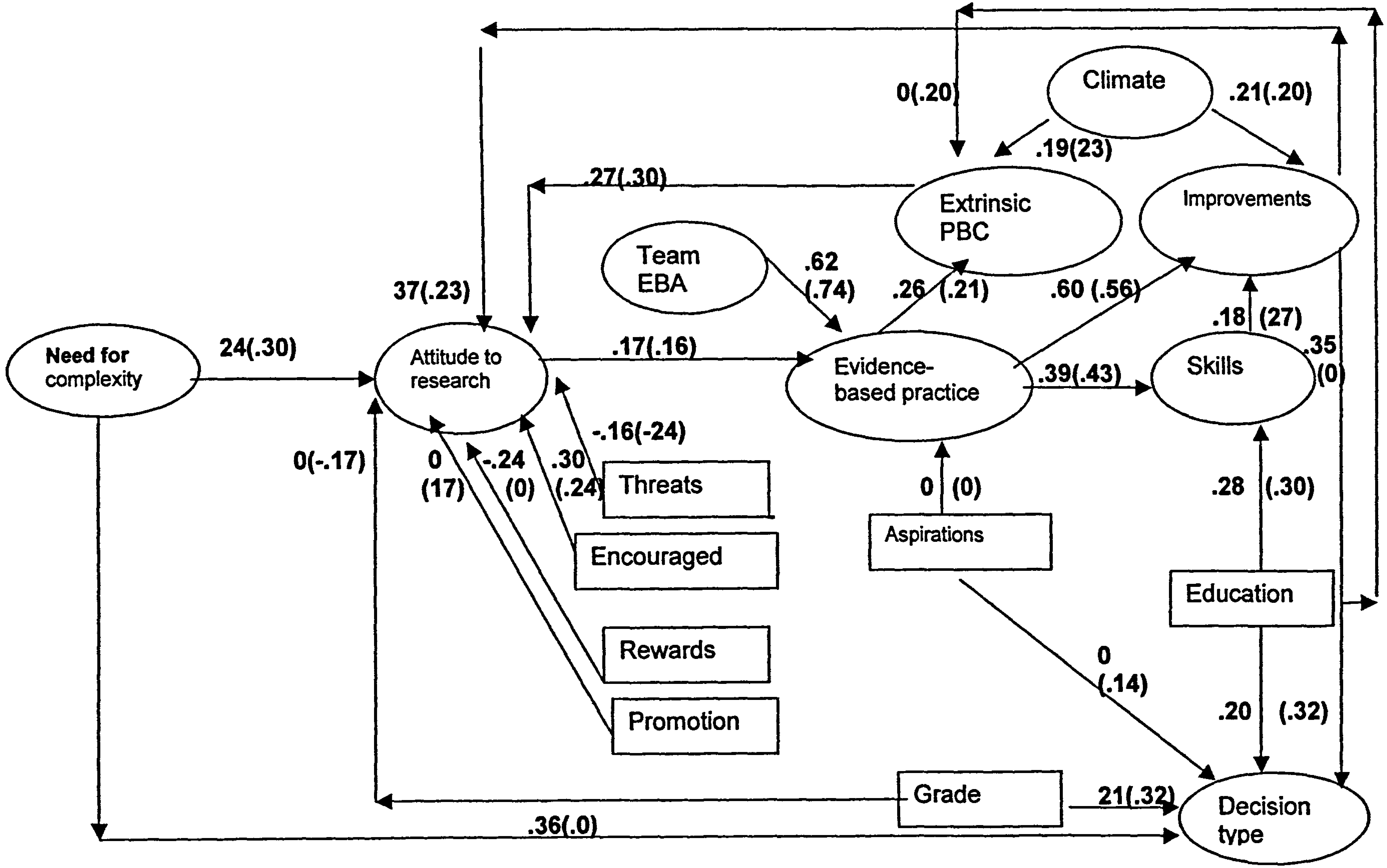
Stability index .122

Note that there is no direct relationship from the *adoption of evidence-based practice* to *attitude to research. Team adoption of EBP* is by far the most important predictor. The two variables, *attitude to research* and the *adoption of evidence-based practice*, have a reciprocal relationship via both *perceived improvements* and from *extrinsic* and *intrinsic perceived behavioural control.* For the clinical management group, there is no relationship between *perceived improvements* and *extrinsic PBC.* (The relationship from *extrinsic PBC* to *perceived improvements* was tested for both groups, but it explained none of the variance in the latter for either group).

As we might expect, the differences between the groups are the same as those we found when I modelled *research utilisation* with these groups. (With the obvious exception of *attitude to research* to *research utilisation* which was not tested in this latest model). *Grade* and *education* are far weaker predictors of *decision type* in the clinical management group, and a supportive *organisational learning climate* is far more likely to provide those extrinsic control factors necessary for the *adoption of evidence-based practice. A threatening and demanding management style* is also far more likely to have a negative impact on the behaviour in the clinical management group. There are no additional significant differences between the groups in this model, despite the apparent difference in parameter weights from *attitude to research* to the *adoption of evidence-based practice.*

Having a positive *attitude to research* is only a weak predictor of the behaviour, it does not necessarily lead one to engage in *evidence-based practice*, (which is a far more precisely defined use of research evidence), particularly when the behaviour is not generally adopted by one's team. It would seem that the ability of past behaviour to predict future behaviour is far more limited when we are talking about a defined way of operating within the team. The team, in this case, dictates what is and what is not acceptable in terms of the justification associated with decision making. The recursive model of the TPB may, therefore, be most accurate when the individual has little choice about engaging in the behaviour, as social pressures will dictate engagement. In this case, it may be social pressure from one's team or from one's professional body.

Figure 7.18 EVIDENCE-BASED PRACTICE The nonrecursive model. High and low CPD groups



High CPD

Chi-square = 94.030

Degrees of freedom = 73

Probability level = 0.049

GFI .95 IFI .98

RMSEA .00 -.057

Hoelter 205

Stability index .204

Low CPD

Chi-square = 86.842

Degrees of freedom = 73

Probability level = 0.128

GFI .95 IFI .98

RMSEA .00 -.04

Hoelter 213

Stability index .124

The modification index suggests a direct relationship between *grade* and *attitude to research* in the low CPD group, where the parameter weight is -.17.

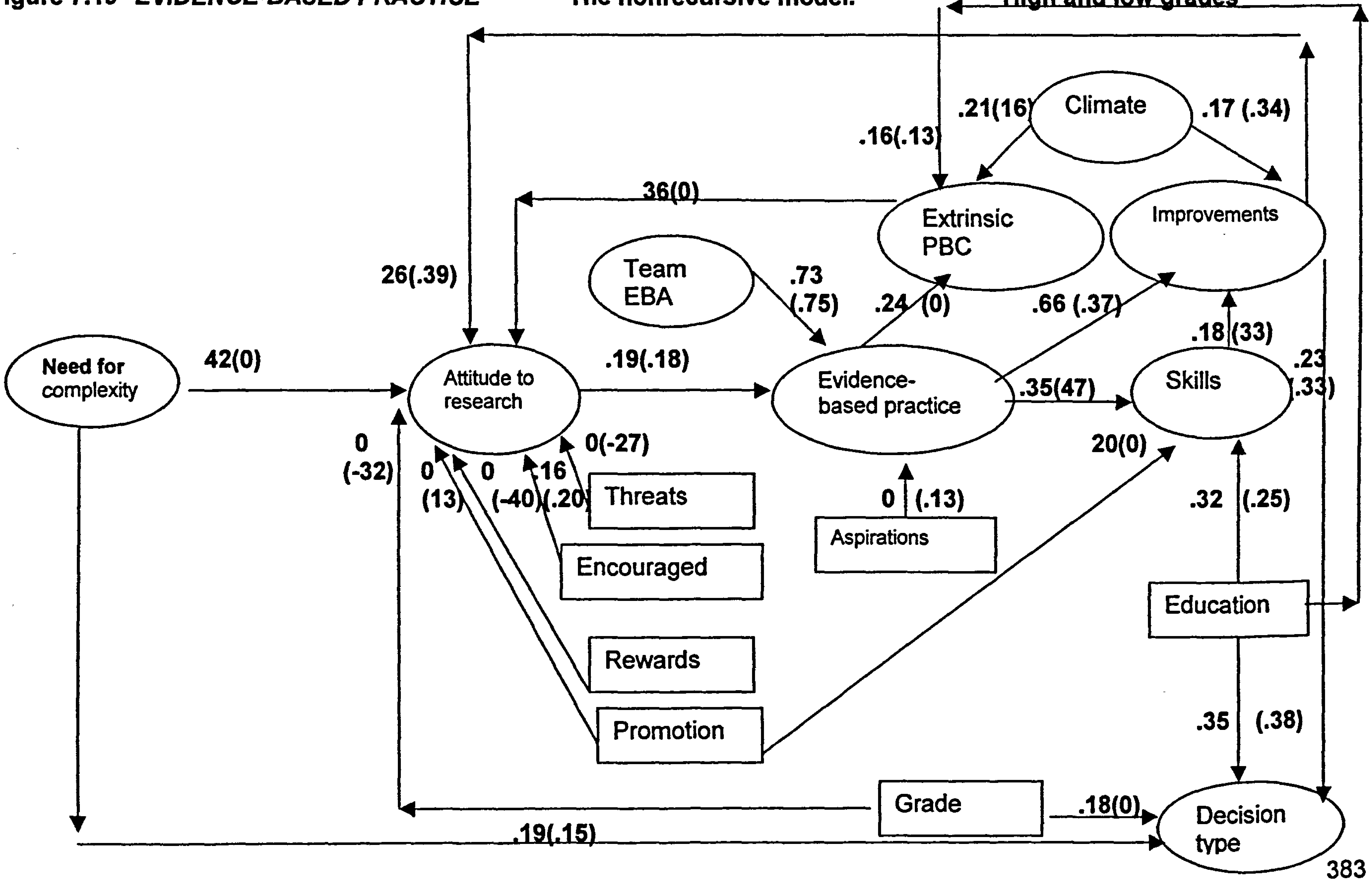
Note that the model is nonrecursive: there is a reciprocal relationship between *attitude to research* and the adoption of *evidence-based practice* via *extrinsic PBC* for both groups, and also a reciprocal relationship between the behaviour and *attitude to research* via *perceived improvements* for both groups. This means that *critical appraisal skills* also indirectly affects the *adoption of evidence-based practice* via its impact on *perceived improvements*.

We find a significant difference between the two groups on only one path. As with the previous model, which considered *research utilisation*, the path from *grade* to *decision type* was significantly different (unstandardised regression weight = low CPD .06 and high CPD .14).

The parameter from *perceived improvements* to *decision type* just fails to reach the level of significance.

The next model in the series will consider the outcome behaviour 'evidence - based practice' with respect to high and low graded posts.

Figure 7.19 ***EVIDENCE-BASED PRACTICE*** **The nonrecursive model.** **High and low grades**



The modification index suggests that *promotion* linked to research expertise leads to the development of *critical appraisal skills* in the high grade group. As this is justifiable theoretically, the path was added. As before, the modification index also suggests a direct relationship between *grade* and *attitude to research* in the low grade group.

High Grade

Chi-square = 110.109

Degrees of freedom = 72

Probability level = 0.003

GFI .94 IFI .96

RMSEA .03-.07

Hoelter 196

Stability index .203

Low Grade

Chi-square = 99.675

Degrees of freedom = 72

Probability level = 0.017

GFI .91 IFI .95

RMSEA .02-.075

Hoelter 150

Stability index .072

(Note that Hoelter is a little lower than one might have hoped, although the model does appear to be a good fit for both groups).

The model is nonrecursive; there is a reciprocal relationship between *attitude to research* and the *adoption of evidence-based practice* via *critical appraisal skills* and *perceived improvements* for both groups, and for the high grade group there is also an indirect relationship between *attitude to research* and *research utilisation* via *extrinsic PBC.*

Five paths show significant differences between the two groups:

The first four significant differences are comparable with the earlier model which considered *research utilisation* and which have already been tested in the smaller, unparcelled models:

i. *Need for complexity* to *attitude to research* (Unstandardised regression weights - high grade .42 low grade .04).

ii. *Reward* to *attitude to research* (Unstandardised regression weights - high grade .14 low grade -1.20).

iii. *Adoption of evidence-based practice* to *perceived improvements* (Unstandardised regression weights - high grade 2.57 low grade 1.61).

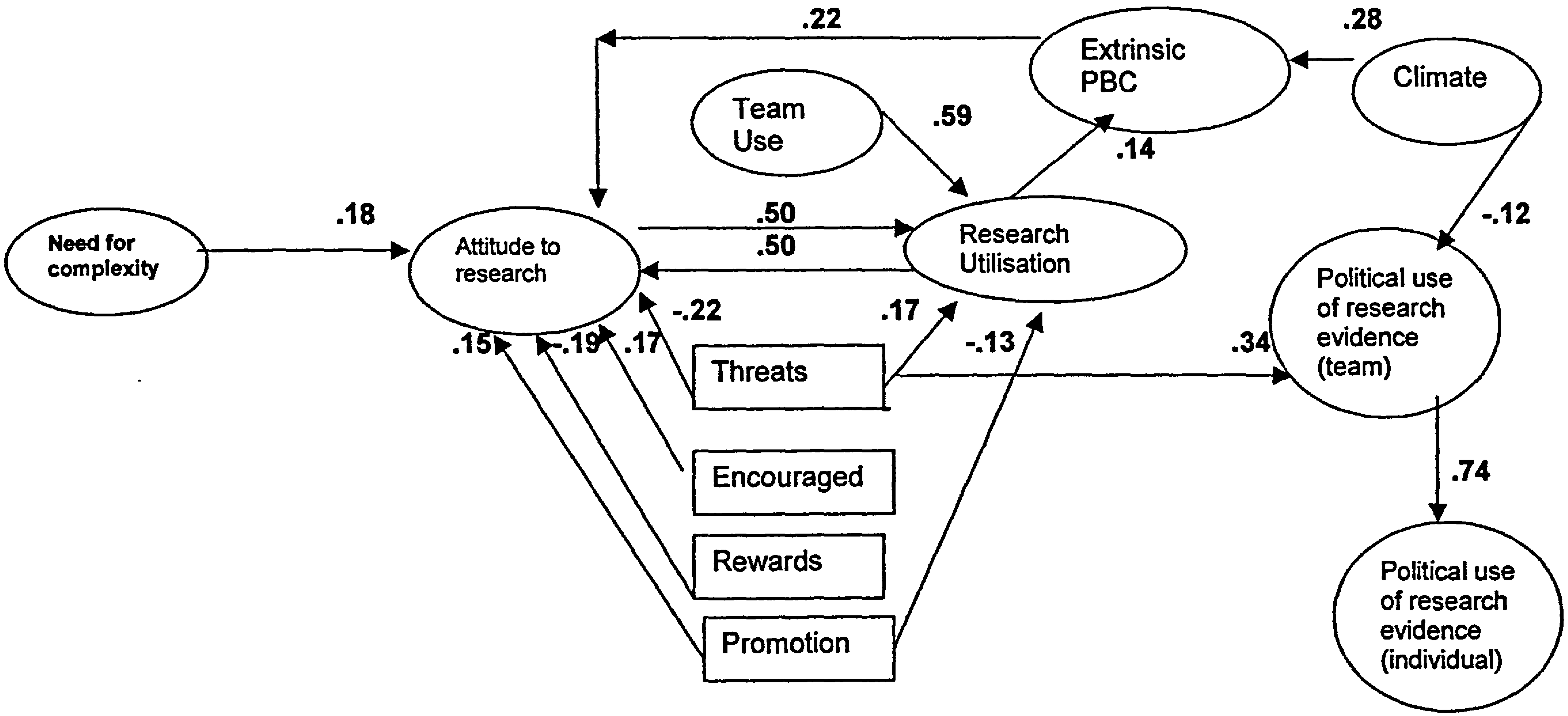
iv *Promotion* to *critical appraisal skills* (Unstandardised regression weights - high grade .66 low grade 0).

I also found that *grade* was a significantly stronger (negative) predictor of *attitude to research* in the low grade group. (Unstandardised regression weights - high grade .31 low grade -1.10).

7.6 Political utilisation of research evidence

I was also interested to explore those variables that predict the *political utilisation of research-evidence*. Whilst political utilisation is frequently mentioned in the research, there has been no attempt to determine the individual, task and organisational characteristics that promote such use. The final model discussed in this chapter attempts to address that omission.

Figure 7.20 *POLITICAL RESEARCH UTILISATION*



Chi-square = 194.684

Degrees of freedom = 129

Probability level = 0.000

GFI .95 IFI .96

RMSEA .025 .045

Hoelter 324

Stability index .467

It is evident that the *political utilisation of research evidence by one's team* is the main predictor of the *individual's political utilisation of research evidence*. A *supportive learning climate*, however, also appears to be able to reduce the amount of *political utilisation of research evidence* (a small, but significant, impact), whilst a *threatening and demanding management style* can promote this behaviour.

Organisational learning climate has a higher (negative) impact on the *political use of research evidence*, in the clinical management group, where it explains 6% of the additional variance. There were no other significant differences between the sub-groups tested.

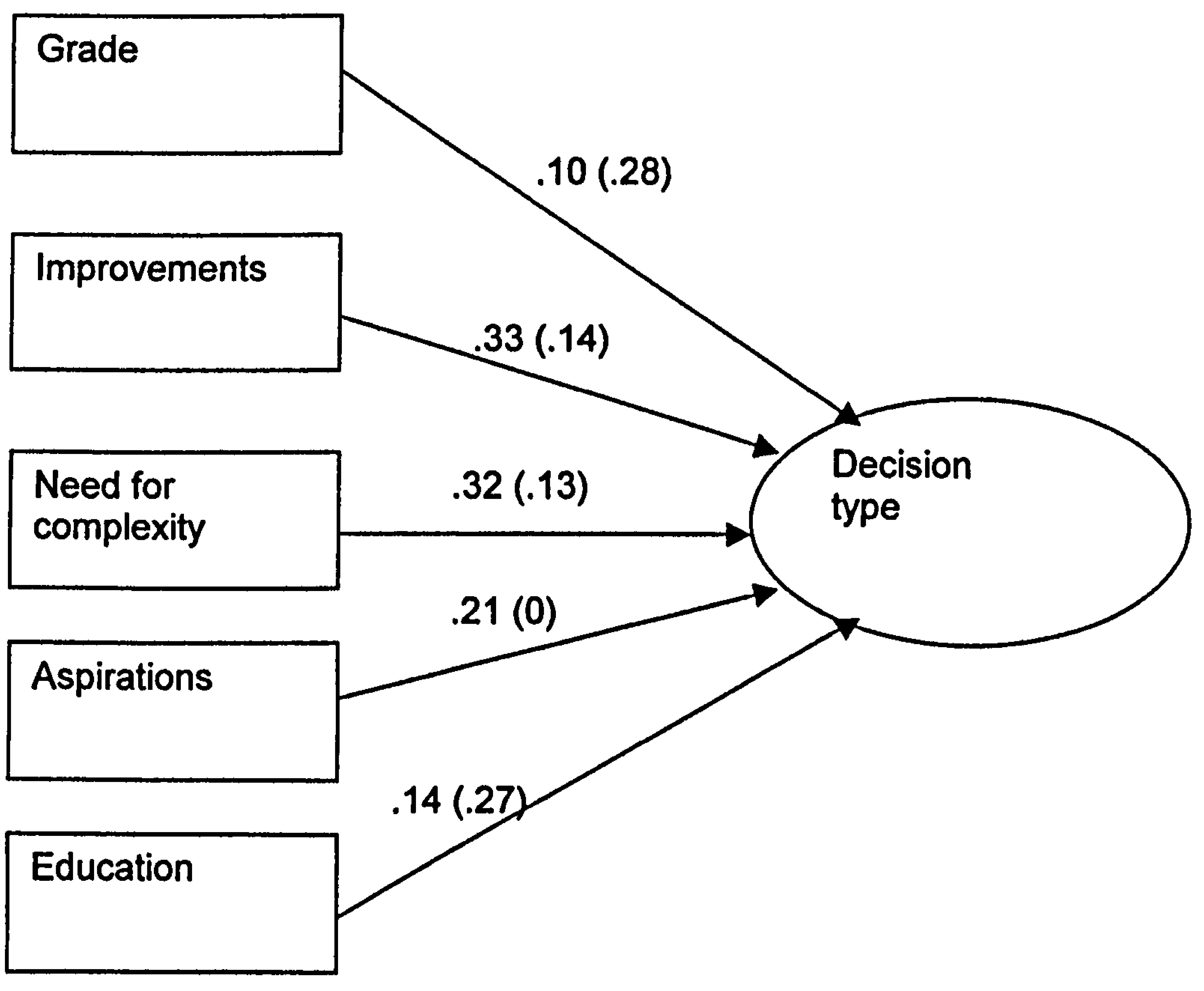
There was no relationship between *political utilisation of research evidence* at either a team or individual level and *attitude to research*, for any of the sub-groups once I had controlled for the predictor variables in the above model.

7.7 Practitioner and CASP group comparisons – Decision Type

It is also possible to test the CASP and practitioner groups with the smaller recursive models associated with the outcome *decision type,* which does not appear to have reciprocal relationships with any of the other variables in the model. It will, however, be necessary to use the parcelled variables in order to maintain a good sample size to parameter ratio.

7.7.1 Clinical Practitioners and Non Practitioners

***Figure* 7.21** Clinical practitioners Predictors of decision type



(Non-practitioner scores in parentheses. The predictor variables were allowed to correlate)

Practitioners

Chi-square = 0.020

Degrees of freedom = 1

Probability level = 0.887

GFI 1.0 IFI 1.0

RMSEA .00

Hoelter 1335

Non practitioners

Chi-square = 8.480

Degrees of freedom = 1

Probability level = 0.004

GFI .99 IFI .97

RMSEA .06

Hoelter .258

Only the regression weight from *grade* to *decision type* is significantly different between the two groups.

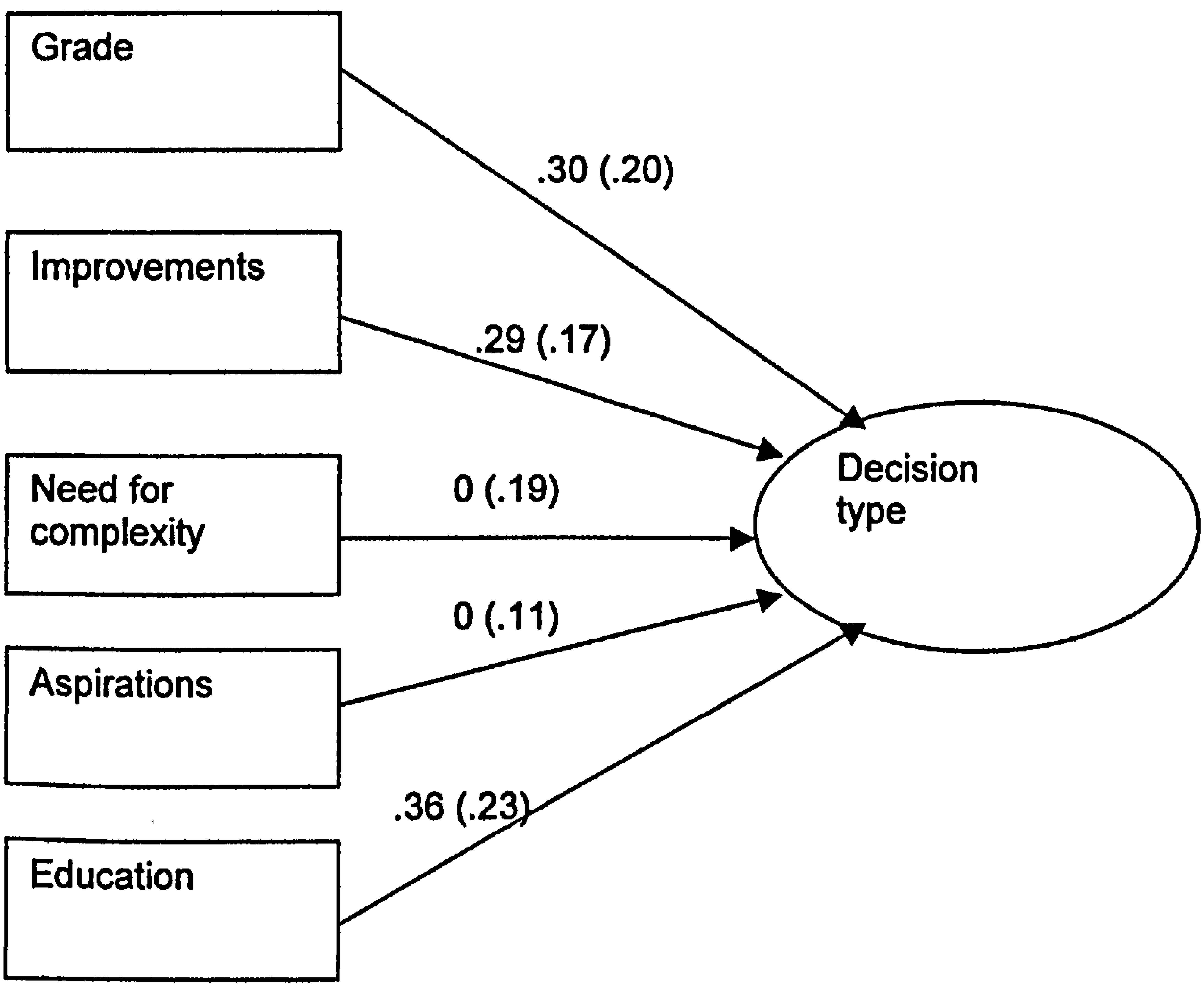
Unstandardised regression weights from *grade* to *decision type*:

Practitioners	.19
Non practitioners	.75

This confirms the previous finding that the more one engages in research utilisation to inform the decision making process, the more one is able to become involved in the strategic decision making process, despite the fact that practitioners are in significantly lower grades than their colleagues.

7.7.2 CASP and non-CASP respondents

Figure 7.22 *CASP Predictors of decision type*



(Non-CASP respondents' scores in parentheses. The predictor variables were allowed to correlate freely)

CASP

Chi-square = 1.098

Degrees of freedom = 1

Probability level = 0.295

GFI .99 IFI .99

RMSEA .00

Hoelter 235

Non CASP
Chi-square = 0.028
Degrees of freedom = 1
Probability level = 0.868
GFI 1.0 IFI 1.0
RMSEA .00
Hoelter .2577

None of the regression weights from the predictor variables to *decision type* are significantly different between the two groups. It is surprising that CASP training is not translating into more strategic decision making.

It was encouraging that the nonrecursive model was well fitting when utilised across a variety of groups and in considering a number of behaviours (outcomes). The next chapter will discuss the findings in more detail and also the implications of these findings on future practise.

I shall conclude this chapter with a brief summary of the findings related to the above mentioned hypotheses before moving on in chapter 8 to discuss these findings and their implications for practise.

Table 7.1

Organisational and role factors:-	
Hypothesis 6. *Perceived Behavioural Control* (both intrinsic and extrinsic) will predict both *attitude to research* and the *adoption of an evidence-based practice* and *research utilisation*, in each of the sub-groups.	*Extrinsic PBC* predicts *attitude to research* in each of the sub-groups, but is able to predict *research utilisation* and *adoption of EBP* only via its impact on *attitude* to research. In lower-graded posts *research utilisation* does not predict any of the variance in *extrinsic PBC.* *Intrinsic PBC (skills)* does not have a direct impact on *research utilisation* in any of the sub-groups: in fact the reverse is the case, with *research utilisation* and the *adoption of EBP* developing the *critical appraisal skill* set in each of the groups.
Hypothesis 7. *Extrinsic rewards* will be a negative predictor of *attitude to research* in all sub-groups, and will be a stronger predictor for those people in lower-graded posts.	*Extrinsic rewards* is a negative predictor of *attitude to research* in all of the sub-groups, with the exception of those in higher graded posts where it has no impact on *attitude to research.* It is a significantly higher, negative, predictor in lower-graded posts.
Hypothesis 8. *Team utilisation of research* will be a predictor of the behaviours in all of the sub-groups, and will	*Team use of research evidence* is a moderate to high predictor of *research utilisation* and the *adoption of EBP* in each of the sub-

be a stronger predictor where there are fewer social pressures outside of the team to engage in these activities, (i.e. in the non-clinical group). *Team utilisation of research* will also be a stronger predictor of the behaviours where people undertake higher levels of Continuing Professional Development (CPD).	groups, although it is not significantly different between the clinical and non-clinical management groups.
Hypothesis 9. *A threatening and demanding management influencing style* will be a stronger direct predictor of the behaviours where respondents work in environments where these behaviours are expected (i.e. in the clinical groups).	*A threatening and demanding management style* is a positive direct predictor of *research utilisation* in each of the sub-groups. This management style is a stronger predictor of *research utilisation* in the clinical management group.
Hypothesis 10. *A threatening and demanding management influencing style* will also impact the behaviours negatively and indirectly, via *attitude to research*, in each of the sub-groups. It will be a stronger predictor where respondents work in environments where these behaviours are expected	*A threatening and demanding management style* has a negative impact on *attitude to research* in each of the sub-groups, although this relationship is not significantly different between the clinical and non-clinical management groups. In terms of the *adoption of EBP*, this management style has no impact

(i.e. in the clinical groups).	on *attitude to research* in the non-clinical management group, and is a significantly higher predictor in the clinical management group.
Hypothesis 11. *Organisational learning climate* will impact upon the behaviours indirectly via its effect on *perceived behavioural control*. It will be a stronger predictor of *extrinsic and intrinsic PBC* in the clinical groups.	*Organisational learning climate* predicts *extrinsic PBC* in each of the sub-groups, with the exception of the non-clinical management group, and predicts *research utilisation* and the *adoption of EBP* only via its effect on *attitude.* The impact of *climate* on *extrinsic PBC* is significantly higher in the clinical management group. *Climate* is not a direct predictor of *intrinsic PBC (skills)* in any of the sub-groups.
Hypothesis 12. The clinical management group, and those in higher grades, will be significantly more likely to generate *improvements* from *research utilisation* and the *adoption of an evidence-based approach.*	*Research utilisation* and the *adoption of EBP* predict *improvements* in all of the sub-groups, although the relationship is not significantly different between the clinical and non-clinical management groups It is a significantly higher predictor in the higher graded group.
Hypothesis 13. The importance of *grade* (and *education)* in predicting *decision-type* will be less important in the clinical groups, and where people undertake higher levels of CPD.	Both *grade* and *education* are significantly higher predictors of *decision-type* in the non-clinical management group and where individuals undertake lower levels of CPD.

Individual factors:-	
Hypothesis 14. *Aspirations* will be a direct predictor of the behaviours modelled for each of the sub-groups, and will be a stronger predictor where these behaviours are expected (i.e. in the clinical group).	*Aspirations* is only a weak, direct predictor of *research utilisation* and the *adoption of EBP*, and this relationship is not significantly different between the clinical and non-clinical management groups, or the high/low CPD groups. It does not predict any of the variance in *research utilisation* in the higher graded group.
Hypothesis 15. *Attitude to research* will be a direct predictor of the behaviours to be modelled in each of the sub-groups, and will be a stronger predictor when we consider respondents working in the clinical groups, and where people engage in higher levels of CPD.	*Attitude to research* is a direct predictor of *research utilisation* and *the adoption of EBP* in each of the sub-groups, and is a significantly stronger predictor in the clinical management group, but not where people undertake higher levels of CPD.
Hypothesis 16. *Need for cognition (complexity)* will be a weaker predictor of *attitude to research* in the clinical groups, and will be a stronger predictor where respondents are in higher grades.	*Need for complexity* is a significantly higher predictor of *attitude to research* in the non-clinical group; it does not explain any of the variance in *attitude* in the clinical management group. It explains a small but significant difference in *attitude to research* in both the high

	and low CPD groups, although there is no significant difference between these two groups. It is a significantly higher predictor of *attitude to research* in the higher graded group.
Hypothesis 17. Respondents' *length of service* will be negatively correlated with *attitude to research* in each of the sub-groups, and this will be significantly higher where the respondent works in a climate where evidence-based practice is a relatively recent phenomenon (i.e. the non-clinical management group).	*Length of service* was not a predictor of any of the behaviours of interest, nor for any of the sub-groups.
Hypothesis 18. *Education level* will be a predictor of the behaviours modelled, only via its impact on *critical appraisal skills*, and will be a stronger predictor of these skills in the clinical groups.	*Education level is* a predictor of *critical appraisal skills* in each of the sub-groups. It is a stronger predictor of *critical appraisal skills* in the clinical management group. It has no direct impact on any of the behaviours of examined (i.e. research seeking, research utilisation, the adoption of evidence-based practice), although it is a moderate predictor of *decision-type.*

<u>Hypotheses related to the political use of research evidence</u>	
Individual factors:-	
Hypothesis 19. *Political utilisation of research evidence within the team* will increase *political use of research evidence by the individual.*	*Political utilisation of research evidence within the team* is the main predictor of the *individual's use of research evidence politically.*
Hypothesis 20. *Political utilisation of research evidence within the team* will have a negative impact on the individual's *attitude to research.*	There was no relationship between *political utilisation of research evidence within the team* and *attitude to research,* in any of the sub-groups.
Organisational and role factors:-	
Hypothesis 21. A management *influencing style based on threats and demands* will increase *political utilisation of research evidence by the individual.*	*A threatening and demanding management style* appears able to promote *political use of research evidence by the individual.*
Hypothesis 22. An *unsupportive learning climate* will increase *political utilisation of research evidence.*	*A supportive learning climate* is able to reduce the degree of *political utilisation of research evidence.* It has a significantly higher, negative impact in the clinical management group.

CHAPTER 8: DISCUSSION OF FINDINGS , IMPLICATIONS FOR FUTURE PRACTICE AND CONTRIBUTIONS TO RESEARCH.

8.1. Introduction

This chapter will discuss the findings from the analysis and their implications for future practice. I will consider the first and second sets of hypotheses separately.

To recap, there were two key sets of objectives in the thesis:

1. **To expand the theory of planned behaviour (and expectancy theories more generally) by utilising nonrecursive structural equation modelling to explore the impact of past behaviour on future behaviour.**

2. **Group comparisons: to identify those factors that support or prevent the adoption of *research utilisation* and *evidence-based practice* across a number of sub-groups, based on the findings from the nonrecursive models, specifically, how the moderating variables might alter the strength and direction of these relationships.**

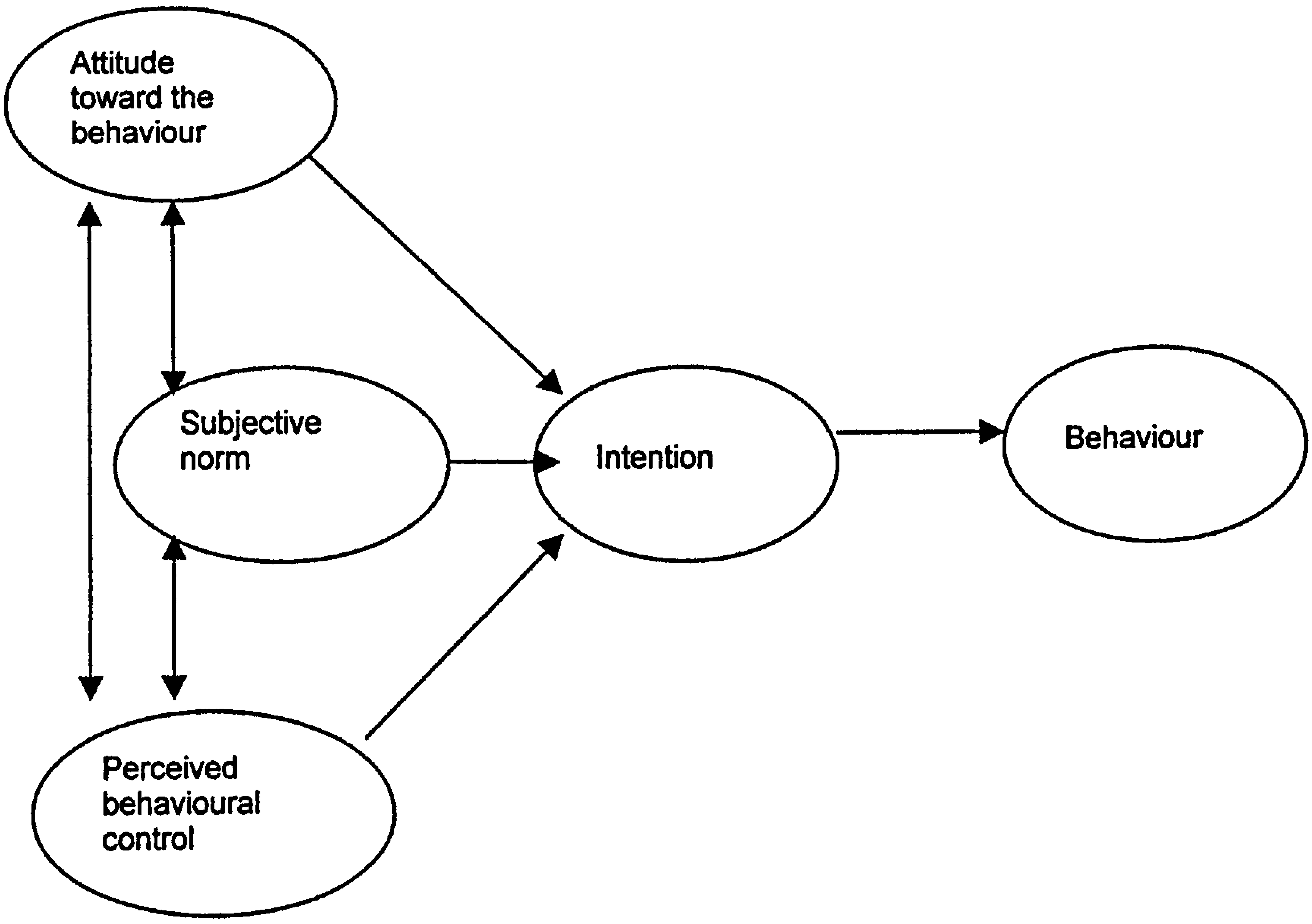
To achieve these objectives, survey data collected from healthcare managers has been modelled and analysed.

8.2 Discussion

It will be helpful to first compare the original model with the proposed model, which aims to address the 'sense-making' aspect of the process, before discussing the findings in greater detail:

Figure 8.1 The Theory Of Planned Behaviour

The original model:



The intention with the revised model was to consider the impact of past behaviour as well as to put increased focus on the way in which people interpret events, by considering the interactions between the predictor variables. It is this interpretation that determines whether or not the event (or stimulus) will have an impact upon future behaviour, and the direction and route of that impact. Attitudes do not remain fixed – change begets change. The model demonstrates how a more positive, or negative, *attitude to research* develops via a number of different routes. I have also separated out the broad constructs (attitude, PBC and subjective norm), as there is reason to believe that they may behave differently in the model.

Figure 8.2 **The Theory Of Planned Behaviour The nonrecursive model:**

Page intentionally blank

Page intentionally blank

We would expect that there might be circumstances when 'behaviour' would impact upon subjective norm, but this would apply only in those circumstances where the individual was sufficiently influential and/or powerful to alter the behaviours of others through modelling that behaviour him/herself.

N.B. The filter via framework of beliefs is not modelled explicitly, but represents the 'sense-making' in which the individual must engage in order to interpret events.

Explanation of the paths in the hypothesised model:

The addition of the framework of beliefs (or, alternatively, the individuals' schematic representation of the way in which the world operates) is an attempt to explain how the original model may be expanded to better understand the inter-relationships between the predictor and outcome variables. If we do not attempt to understand the reasoning process, then we would be at a loss to explain or predict the circumstances under which intrinsic and extrinsic motivators predict behaviour either directly, or indirectly via their impact on *attitude to research*. It is the individual's assessment of the situation that is key here.

From the literature, the framework of beliefs is hypothesised to rest on a number of basic needs or motivators, for example:

The need for affiliation

The need for self-esteem/positive self regard

The need to avoid punishments and to seek rewards

The need for consistency between beliefs, and beliefs and actions

External stimuli must be made sense of and it is via this sense-making that we make a decision about whether or not we are sufficiently motivated to perform the intended behaviour, and, perhaps more importantly, why specific variables motivate (or demotivate) us in this way. This sense-making might involve asking questions such as: is my behaviour consistent with my attitudes towards the behaviour? Will engaging in the behaviour bring rewards or punishments? What are the motivations of others in attempting to influence me in this way? Does proficiency in this area increase my self-esteem or is it irrelevant to my sense of self-worth? etc.

(1) Starting from the point of prior engagement in the behaviour of interest, the individual attempts to make sense of the reasons for their engagement in the behaviour. If the behaviour was under one's own volition, then one would expect theories such as cognitive dissonance, self-attribution theory etc. to be able to explain the reason for the direct link **(3)** to developing a positive attitude towards that behaviour. It could also be the case, however, that the individual makes the assessment that there were reasons (other than their intrinsic motivation) for engaging in the behaviour; examples might be, social pressure or fear of sanctions or the desire for rewards. In these instances, we would expect a direct link from this reasoning to the performance of the behaviour (should those circumstances still prevail), by-passing the need to form a judgment (or attitude) about the behaviour **(2)**. We must also not forget that habit may, in addition, play an important role in the repetition of the behaviour.

The model also takes into account outcomes arising from the performance of the behaviour. One must not only make sense of these outcomes in terms of whether or not they are perceived to be positive or negative, but also assign reasons for the outcomes. Positive outcomes could potentially increase self-esteem, or feelings of mastery over the environment, which one might expect to then have an impact on attitudes. **(5)** Of course one might also be tempted to ascribe outcomes (particularly negative outcomes) to external factors. Or, if one's self esteem, or self-efficacy, is low, to luck or co-incidence. If someone has low self-esteem they may, for example, ascribe a positive outcome from their behaviour as down to chance rather than their skill level. These assessments might affect one's attitude to the behaviour of interest, but they could also conceivably have little or no impact on attitude. We can witness examples of this when people contract illnesses that their doctor ascribes to smoking. The patient, however, may find alternative explanations for the illness that have nothing to do with their smoking; we would expect their attitude to the behaviour, in these circumstances, to remain unchanged. If their attitudes remain unchanged they are likely to continue the behaviour unless prevented or persuaded by external pressure.

One would also reasonably expect that a positive attitude towards a behaviour is more likely to lead to lead to the performance of that behaviour, all things being equal **(4)**, and that the behaviour will then lead to a variety of outcomes both positive and negative **(12)**. It also seem reasonable to expect that, where circumstances are conducive, the performance of the behaviour is likely to improve self-efficacy (intrinsic control) as well as mastery over environmental factors (extrinsic control) **(7)** Neither is it unreasonable to expect that this increased behavioural control would lead to more effective outcomes arising out of the performance of the behaviour **(6)**, particularly as regards one's skill level.

The predictor variables also need to be interpreted in terms of what they mean with respect to their motivational impetus, or strength, to engage in the behaviour **(8)** and **(9)**. For example, one might decide that one has little choice about performing the behaviour if one is to gain acceptance by the group. Under such circumstances we would expect that performance of the behaviour does not require one to develop a positive attitude to research (albeit that positive outcomes from such engagement may then lead to this improved attitude). On the other hand, if we believe that we are being rewarded or intimidated into performing the behaviour, this may have a negative effect on our attitude towards that behaviour. The reasoning might go as follows: if I have to be rewarded for performing the behaviour it can't be that enjoyable or, alternatively, the lack of procedural fairness in distributing the rewards could lead to a negative attitude towards the behaviour the rewards were intended to encourage.

The literature tells us that personality characteristics can lead to the development of positive attitudes **(11)**. I have shown this relationship to operate via one's framework of beliefs as one must make an assessment about whether this broad disposition will lead to positive or negative attitudes in these particular circumstances. Environmental factors and prior experience will no doubt play a part in this consideration: for example, the acceptability of the attitude within one's social group, and prior exposure to the behaviour of interest. Path **(13)** was added as there is a suggestion in the literature that the behaviour may be the result of a 'knee jerk' reaction, for example to authority. It is an automatic response that has not involved any consideration.

8.2.1 ***Discussion related to the first set of hypotheses***

1. The variables identified in the Theory of Planned Behaviour will predict a high degree of the variance in research utilisation, research seeking and evidence-based practice.

2. Personality variables (i.e. *need for cognition*); *academic achievement*, *experience* and *grade;* and environmental factors (*organisational learning climate* and *managerial influencing style*) would be important additional predictors to those identified in the Theory of Planned Behaviour.

3. Nonrecursive models will obtain improved measures of fit, as the recursive model (specified by the TPB) ignores causal relationships between the predictor variables, some of which will impact directly upon the behaviour, others via their impact on *attitude to research.*

4. The original model's use of broad constructs (assumed to be unidimensional) disguises the way in which sub-factors within these global constructs operate differently in predicting behaviour.

5. The recursive model will be overly simplistic, in that it does not predict how past behaviour might influence future behaviour via the following mechanisms:

a. Increasing skill level (self efficacy)
b. Improved *attitude to research*
c. Increasing views about mastery over external environment (*extrinsic PBC time, access, authority*)
d. Via *perceived improvements*

- thereby over or under predicting the regression weights.

The variables identified in the Theory of Planned Behaviour did predict a high degree of the variance in research utilisation and evidence-based decision making, despite the fact that the survey questions had not been phrased in the typical, or suggested, format. In both the recursive and nonrecursive models the behaviour of one's immediate team and one's attitude towards the behaviour in question were by far the most important predictors. The nonrecursive model did, however, provide us with greater information in terms of how one might influence the attitude of employees to feel more positively about the behaviour their employers intend to encourage. Whilst attitude can be altered by direct experience, even when this is controlled for, we see that several other variables have an impact upon the individual's attitude; some positive and some negative.

The Theory of Planned Behaviour has been criticised for ignoring personality and environmental variables. It would appear that, in this analysis at least, personality variables operate through one's attitude towards the behaviour in question. It predicted very little of the variance in any of the behaviours, although it does shed light on why some people may have a more positive attitude towards the behaviour in question, particularly where one has less direct experience of the behaviour in question. Work *experience* and *grade* did not predict any of the variance in the behaviours examined. *Education level* was not a significant predictor once I have controlled for the impact of *critical appraisal skills.* Environmental factors such as *organisational learning climate* and *influencing styles* of respondents' line managers were significant predictors of the behaviours modelled. In terms of the *organisational learning climate*, whilst it is only a small indirect predictor of the behaviours, it provides insight into the way in which a supportive learning climate can promote improvements arising out of that behaviour, as well as being more likely to ensure that the resources required to engage in the desired behaviours are provided. It would seem that a supportive organisational climate is more likely to provide the time, access and authority needed to adopt a research (or evidence-based) approach to decision making. A *threatening and demanding management style* predicts each of the behaviours directly, but also indirectly via its negative impact on *attitude to research.*

We can see from the analysis that the original model's use of broad constructs (subjective norm, attitudes, PBC) disguises the way in which sub-factors within these global constructs operate differently within the model. They are assumed in the original model to be unidimensional, yet *intrinsic* and *extrinsic PBC* behave quite differently in the nonrecursive model. The variables related to social norms also appear to be operating differently, depending upon the way in which they motivate the individual. If there is the expectation within the team that decision making will be research-based, and this practice has been widely adopted, then the individual may engage in the behaviour to seek rewards or to avoid punishment, or engaging in the behaviour may meet the individual's need for affiliation. None of these motivators necessarily require the individual to have a positive attitude towards the behaviour. Other variables related to social norms may motivate the individual indirectly via their impact upon his/her attitudes towards the behaviour; verbal encouragement is an example of this.

I would conclude that the original model is overly simplistic, in that it does not predict how past behaviour might influence future behaviour. The analysis showed that past behaviour could influence future behaviour through a variety of mechanisms; not simply through the development of perceived behavioural control, as Ajzen predicted, but also because people appear to be motivated to seek consistency between their beliefs and actions. In addition, if one perceives that improvements have resulted from engagement in a behaviour, this can also predict future engagement if the individual develops a more positive (or negative) attitude towards it. The original model does not allow for this feedback loop, nor does it enable one to see that each of these reciprocal relationships can operate simultaneously, and to determine their relative predictive strength.

Surprisingly, increasing *intrinsic PBC (critical appraisal skills)* did not appear to have a reciprocal relationship with any of the behaviours examined, other than a very weak one in the case of *evidence-based practice*, where it had an impact on *perceived improvements*. I had thought that one explanation for this finding might have been that the skills I had identified were not those the respondents believed were necessary to undertake *research seeking* and *utilisation*. However, it was interesting to find that even a direct question, which asked if people believed they had the requisite skills, also failed to predict any of the variance in research seeking or utilisation.

The original (recursive) model leads to inflation of parameter weights, as it largely ignores the fact that 'change begets change', and, whilst allowing the predictor variables to correlate, does not take into account the fact that there may be causal relationships between those variables. Some of the predictor variables will impact on the behaviour directly; others will impact indirectly, for example, via *attitude to research*, depending upon how the meaning of the event is interpreted. The analysis shows that several of the variables related to *PBC* or subjective norms have their influence via attitude to the behaviour – rather than a direct relationship, but the original model is insufficiently comprehensive to identify these relationships.

We need to take account of how people make sense of external stimuli and their own behaviour and make judgments about what this means in terms of their future behaviour. We need to introduce the idea of 'sense-making'. The way in which people interpret external stimuli will determine whether or not it will motivate them to behave in a certain way, as well as *how* it will motivate. If the individual is ambitious, for example, then linking promotion to research-based practice, is likely to motivate the individual to engage in that behaviour as they are motivated by that reward. They would not necessarily need to have a positive attitude towards research-based practice. If they believe the behaviour is 'the done thing', then they may engage in the behaviour to avoid sanctions, or because they are motivated by the need for affiliation. Again, their attitude towards the behaviour may be unimportant. It appears from the model that variables which impact on the behaviour indirectly, via attitude, are those which motivate (or demotivate) the individual by increasing or decreasing their self esteem or self efficacy; and those which increase or decrease the individual's intrinsic motivation with respect to the behaviour. Some variables operate both directly and indirectly. A *threatening and demanding management style*, for example appears to lower the individual's intrinsic motivation towards the behaviour, whilst at the same time motivating the individual to engage in the behaviour to avoid sanctions. The nonrecursive model appears to be a more accurate representation of what happens in practise, and also has greater explanatory power.

8.2.2. <u>*Discussion related to the second set of hypotheses*</u>

We can see from the analysis that the model is well fitting across each of the sub-groups, and across the behaviours considered in the analysis.

It is possible, utilising the nonrecursive model, to examine how organisational attempts to encourage behaviour have their influence once we have controlled for the impact of *attitude to research* on the behaviour, and the impact of past behaviour upon *attitude to research*. We can also examine the extent to which past behaviour has its influence on increasing one's opinion of that behaviour, and the mechanisms through which these changes might happen. This gives the model greater explanatory power.

Those variables that have a direct impact on the behaviour, once we have controlled for *attitude to research,* are those which do not require the individual to make an assessment of how positively or negatively they regard that behaviour. If the behaviour is expected and adopted within the team; it's the way 'things are done around here' then the motivation to engage in this behaviour arises from the need to avoid sanctions or to increase one's feelings of affiliation with the group, motivations which are familiar to the majority of people, particularly those working in organisations. In most instances we go along with the established practices of the team in which we are working to the extent that it appears we have little choice if we wish to be perceived as effective, remain in employment, and generally enjoy an easier life through avoidance of conflict. Contrary to the predictions, there were no significant differences between any of the sub-groups, in the extent to which *team utilisation of research* would predict *individual research utilisation.* It would seem that other external influences, such as pressure from one's professional body, do not moderate the extent to which the immediate team's behaviour impacts upon one's own behaviour.

Some people may also engage in the behaviour, regardless of their opinion of it, if they are intrinsically motivated to achieve promotion and recognition (achievement oriented). People who have a high need for achievement are more likely to engage in the behaviour regardless of their personal opinion of it, if they believe it is one which is valued by the organisation. In fact, *aspirations* was not a strong predictor of the behaviours in any of the groups I considered. I had expected that *aspirations* would be a more important predictor of both *research utilisation* and *evidence-based practice* in those groups where promotion is linked to research expertise. I had made the assumption that this would be in the clinical groups. I found, however, that clinical practitioners and clinical managers were no more likely than general managers to believe that promotion was linked to research expertise. *Aspirations* was, therefore, not a significantly more important predictor of these behaviours in any of the sub-groups. It is surprising that teams which have a longer history of attempting to promote research use, are no more likely to link promotion to research expertise, than those where this is a more recent development. Finally, the use of threats and demands can also increase one's engagement in the behaviour regardless of one's opinion of it, to the extent that one has a need to reduce fear and/or avoid sanctions and believe that adoption of, or increased engagement in the activity will militate against this. I will come back to this point later.

In the nonrecursive model, in considering the impact of *attitude to research* on the behaviours, we have controlled for the impact of the behaviour of the team, one's personal achievement orientation, and threats and demands on the individual's behaviour. These variables have their impact via the extent to which the individual is motivated by the need for affiliation, the need to avoid sanctions, and, potentially, the need to avoid conflict and thereby exert less effort in challenging established practice. It also accounts for the individual's need to avoid or reduce fear/anxiety in the face of a threatening and demanding managerial influencing style. This behaviour is more likely to have an impact on *research utilisation* and *evidence-based practice*, where the organisation expects the line manager to have their staff engage in these behaviours as this will direct the manager's focus of their threats and demands. The analysis did in fact find that a *threatening and demanding management style* was a stronger (negative) predictor of both *research utilisation* and *evidence-based practice*. A key point here is that none of these drivers require the individual to have a positive attitude towards the behaviour prior to their engagement in it.

However, over and above these motivators, or drives, the individual will engage in an activity when they feel positively towards it; people have a need to behave in a way that is consistent with their beliefs regarding the positive or negative assessment of a given phenomenon. When the behaviour itself is believed to bring about desired outcomes the assessment will be positive; it is considered a worthwhile activity because it generates improvements in one's day-to-day work activities and/or is intrinsically motivating. *Attitude to research* will predict behaviour to the extent that the individual believes these outcomes to be worth the effort required to translate these positive beliefs into practice, and also about the opportunities available to do so.

Attitude to research explains 45% of the variance in *research utilisation*, but is a far lower predictor of *research seeking* and the *adoption of evidence-based practice.* In the case of the latter, this is likely to be a result of the lower number of respondents who engage in this specific behaviour. Attitudes are stronger predictors where they are specific to the behaviour being investigated. In the case of *research seeking,* a positive *attitude to research* does necessarily lead one to utilise the sources of research evidence I specified in the survey. It may be that other sources are used; but it could also be the result of more research evidence being supplied to healthcare managers, rather than expecting managers to seek out this evidence themselves.

A positive attitude is a strong predictor of *research utilisation* in all of the sub-groups examined. As predicted, it is a more important predictor in groups where such behaviour has a longer history (i.e. in the clinical management group). Here, there are likely to be fewer barriers, and more opportunities to translate a positive *attitude to research* into practice. The individual will make an assessment about the effort he/she is willing to exert, and assess the opportunities available to engage in the behaviour towards which they have made a positive evaluation. If opportunities are more limited, we find that attitude is a significantly weaker predictor of behaviour.

The belief that it would also be a significantly stronger predictor for those people who are more intrinsically motivated to achieve higher performance standards (i.e. those people who undertake higher levels of CPD) was incorrect. It may be that without the opportunities to channel positive regard of the behaviour into action, higher intrinsic motivation will not significantly increase the likelihood that this will happen. Alternatively, my belief that higher levels of CPD indicated higher intrinsic motivation to improve performance was incorrect. It may be that the levels of CPD an individual undertakes is determined more by the organisation or team in which they work than their intrinsic motivation.

Prior engagement in research utilisation is the strongest predictor of respondents' *attitude to research.* The t-tests discussed earlier also show that those groups that have a longer history of research-based decision making feel more positive about it. There may be a number of explanations for this. Firstly, people are simply more comfortable with those things with which they are familiar. Secondly, the theory of cognitive dissonance would suggest that people are motivated to maintain a consistency between their beliefs and actions, and thirdly, it may increase respondent's feelings of affiliation with the team, which in turn promotes a positive attitude. In addition to increasing positive affect, if the behaviour results in valued outcomes, then this too can encourage a more positive attitude via changed cognitions. We can see from the model, which considers the *adoption of evidence-based practice,* that the relationship between behaviour, and the development of a positive attitude towards it, may also be mediated by *perceived improvements* arising out of the engagement in that activity. Had the questions about improvements also related to *research utilisation* and *research seeking*, then it is likely that it would have mediated the attitude-behaviour relationship in these models too. The fact no direct relationship exists from the *adoption of evidence-based practice* to *attitude to research*, may be insufficient for us to conclude that the inclusion of 'perceived improvements' in the other models would have resulted in the same findings. Evidence-based practice is unlikely to be a strong predictor of attitude to research in this group, as it is not an activity that is as widely practised as *research utilisation* more generally; it is the latter behaviour from which people will largely have derived their *attitudes to research.*

The development of the nonrecursive model enables us to see that *research utilisation* and *evidence-based practice* can predict *attitude to research* indirectly via *perceived behavioural control.* The extent to which people believe that engaging in a particular behaviour will be easy or difficult has been found to be a factor in attitude development. The more that people utilise research evidence, the stronger will be the belief that they have requisite resources, which in turn improves their '*attitude to research*'. This sense of mastery may also increase self-esteem, which would be expected to improve attitudes towards the behaviour. In this respect, however, intrinsic and extrinsic perceived behavioural control behave rather differently with respect to their impact on *attitude to research.* Whilst both are improved by engagement in the behaviours, only extrinsic perceived behavioural control has a direct impact on attitude to research. It is surprising that stronger *critical appraisal skills* do not lead to an improved *attitude to research* as it was predicted to be a strong predictor due to its impact on enhanced self-esteem/self-efficacy. When I considered the respondents' own perceptions of their skill levels required to appraise research evidence, this variable too failed to predict any further variance in *attitude to research,* suggesting that it was not simply a problem related to the way in which *critical appraisal skills* had been measured.

It is not always the case, however, that *extrinsic perceived behavioural control* is improved as a result of engagement in the behaviours modelled. In the case of people in lower grades, for example, neither *research* utilisation nor the *adoption of evidence-based practice* leads to an increase in *extrinsic PBC.* If more resources were made available to more junior staff to enable their engagement in these activities, then, the findings suggest, a virtuous circle would be created whereby the behaviour increases one's attitude towards it, which in turn promotes the desired behaviour.

It was surprising, therefore, to find that clinical and non-clinical managers do not differ significantly in their beliefs about whether they are given the time to review research evidence, despite the longer history in the clinical management group, and the amount of previous research which highlighted the importance of extrinsic factors associated with perceived behavioural control. An issue in increasing research utilisation in the non-clinical management population is the need to increase their authority to actually apply their research evidence in practice. It also appears, however, that while the provision of time, access and authority required to seek out and utilise research findings is important, it is not as important as previous research had suggested. This is unsurprising, as, in general, prior research had failed to control for many other variables in the model, including past behaviour, focusing primarily on barriers to utilisation.

It was surprising that CASP training did not significantly improve the trainees' *attitude to research* (when compared with their colleagues) despite the fact that it had a very positive impact on *critical appraisal skills.* There may be a need to consider how the trainers might improve participants' *attitude to research* as part of the training programme. We can see from the structural paths in the nonrecursive model that increasing *intrinsic PBC*, in itself, does not encourage a more positive *attitude to research.*

Evidently organisational initiatives that can have a positive impact on an individual's *attitude to research* will reap benefits because of the 'virtuous circle' between *attitude to research*, which can increase engagement in the behaviour (even in the absence of external pressures), which then in turn promotes an even more positive '*attitude to research*'.

Next I will examine the nonrecursive model to consider those variables that represent the deliberate attempts by the organisation to encourage the adoption (or increased performance) of the behaviour, via 'incentives' both positive and negative. It is clear that they must have an impact over and above that explained by the individual's past experience of the behaviour; their current attitude towards the behaviour; the extent to which that behaviour is practised in their immediate team; and personality traits (i.e. *need for complexity*) which might predispose one to forming positive or negative attitudes towards a given phenomenon.

Encouragement does not have a direct impact upon research utilisation or evidence-based practice: its effect is via its ability to improve the individual's beliefs about the ability of these behaviours to generate wanted outcomes. The intention is to encourage the desired behaviour by persuading the individual that the activity will generate positive outcomes and/or is within their capabilities to achieve. The encouragement may also take the form of positive re-enforcement for the behaviour already engaged in: for example, a 'well done' or 'thank you'. In the first instance one is improving attitude via cognitive processes, and in the later via increased positive affect towards that behaviour. In any event, the encouragement is directed towards improving the attitude towards that behaviour. It will do this to the extent that the individual receiving the encouragement respects the source of the message and believes it to be true, or in the case of encouragement for behaviour undertaken, the extent to which this has an impact on one's self esteem, thereby increasing one's positive feelings about the behaviour. The positive impact of *encouragement* on attitude to research is in line with previous research that suggests that verbal encouragement is more likely to encourage the behaviour in question than are extrinsic rewards, which can be far more complex to deliver effectively. Gottfried *et al* (1994, p. 104) for example, found that verbal encouragement had a positive impact on students' intrinsic motivation, which they defined as 'pleasure derived from learning and being involved with challenging and difficult tasks.' Conversely, they found that offering rewards and punishment that emphasised external control actually impeded academic achievement.

Threats and demands are directed towards increasing people's engagement in the activities required by the line managers. This 'incentive' is not concerned with increasing the individual's positive regard for the activity, merely ensuring that they engage in it regardless of their personal perspective. We can see, however, from the model (which enables us to control for the impact that this behaviour has on the individual's engagement in *research utilisation* and *evidence-based practice,* that a *threatening and demanding* style does have an unintentional negative effect on the individual's assessment of the behaviour. This may be because threats can generate 'reactance' (Barr et al 1980). When one's freedom to choose is threatened or eliminated, people are motivated to retain a feeling of autonomy. This results in attitudes being changed in the opposite direction to that which is hoped for. Another explanation is that people may come to the conclusion that, if threats and demands are required in order to achieve the desired behaviours, then the behaviours cannot, in themselves, be expected to bring about desired outcomes. Parallels can be drawn between these findings and those of Guthrie *et al* (1996) who claimed that intrinsic motivation is likely to be higher when people perceive the learning environment to be non-threatening to their self-esteem.

A further, and probably not unrelated, consequence of adopting a threatening and demanding management style, is that it appears to encourage the team to utilise research evidence politically (one might even claim unethically), by manipulating or ignoring research evidence to justify decisions made on other grounds, or by only using research evidence when it suits those in positions of influence within the organisation. This behaviour, in turn, encourages the individual to adopt a similar approach. One explanation may be that these individuals are also adopting a 'success at any cost' approach which may be prevalent within the team where a threatening and demanding management style prevails, but a further explanation might be that such a style decreases the individual's loyalty to the organisation, and promotes behaviours s/he he knows the organisation would disapprove of. Either way, the adoption of such an approach, whilst not entirely negative in terms of enforcing the desired behaviour, would appear to be a high-risk strategy, particularly over the long-term.

Extrinsic rewards (once we have controlled for verbal encouragement/praise) are generally employed by organisations to encourage required behaviours regardless of the individual's perception of those behaviours, usually taking the form of a financial incentive. It is interesting to find that the nonrecursive model employed demonstrates that such rewards have no direct impact on the behaviours they are designed to encourage; perhaps lending some support to the belief that 'money is not a motivator'. *Extrinsic rewards* can, however, have a negative impact on *attitude to research*. This may be due to the belief, as with the use of threats, that if a behaviour must be rewarded, (i.e. there must be some extrinsic force to motivate the behaviour) then this is assumed to be operating because the behaviour itself is not intrinsically motivating. Yet, if we accept this explanation it is difficult to explain why, having controlled for this impact on *attitude to research, extrinsic rewards* cannot have a direct impact on those behaviours they are intended to encourage. A better (or even additional) explanation may be around the way in which these rewards are implemented in practice. It is extremely difficult to reward individual performance in a way that people feel is fair and equitable and this can lead to feeling of 'procedural injustice.' When this occurs, not only will employees feel more negatively about the behaviours the rewards are designed to encourage, but they will also recognise that the way in which rewards are linked to performance is not just unfair, but unreliable and, perhaps, rather arbitrary. That being the case, it is unlikely that employees' motivation to engage in these behaviours will be increased. This highlights how difficult the use of extrinsic rewards for the achievement of desired performance can be in an organisational context. It can be particularly demotivating for those in lower-graded posts who are further removed from the decisions about how rewards will be allocated and may feel a greater sense of the organisation imposing control. Certainly the linking of rewards to research expertise had a significantly higher negative impact on those people in more junior positions.

I had expected that linking *promotion* to the level of research expertise of employees would directly increase their motivation to engage in both *research utilisation* and *evidence-based practice*, regardless of their *attitude to research.* In fact, the belief that promotion is linked to such expertise has a positive, direct impact on *attitude to research.* Promotion is obviously operating differently to the broader construct of *extrinsic rewards.* Additionally, I was surprised to find that, in some of the groups examined, the belief that promotion is linked to research expertise can be a disincentive to engaging in *research utilisation* and or *evidence-based practice* once I have controlled for the other variables in the model.

People in higher graded posts will also be significantly more likely to develop the requisite research expertise if they believe it can lead to increased promotion prospects. It is likely that they have greater control over their professional development and are more able to direct their learning in a way that they know will be valued by the organisation.

In addition to external influences on behaviour we know from twin studies that inherent characteristics and preferences can influence attitude formation under certain circumstances. *Need for complexity* (which I am suggesting is a more stable personality trait, rather than a, more malleable, attitude towards something) does appear to predispose people towards a positive *attitude toward research.* There were no significant differences in *need for complexity* between any of the groups tested, except those in higher graded posts, suggesting that it is a relatively fixed aspect of the individual's personality, whereas attitudes appear to be less resistant to change. It was predicted that that greater experience of the behaviour in question would result in personality traits (*need for complexity*) becoming less important in predicting one's attitudes, as the latter are formed increasingly via direct experience of those behaviours. As people engage in the behaviour more frequently their judgment of the behaviour will come from personal experience rather than a predisposition for or against the behaviour in question. Indeed, n*eed for complexity* was found to be a higher predictor of attitude to research in the non-clinical management group.

Need for complexity is also a stronger predictor of attitude to research in the higher graded group; we know from the t-tests that need for complexity is associated with higher grades; yet people in higher and lower grades demonstrate no significant difference in the extent to which they utilise research evidence. There is a question mark around why *need for complexity* is far more likely to predict a positive *attitude to research* in higher graded posts. Need for complexity is also an important direct predictor of *decision-type* where it appears to lead to more strategic decision making, having controlled for both grade and education level.

Indirect predictors of attitude to research

Climate is an indirect predictor of both research *utilisation* and *evidence-based practice*. It is generally accepted in the research literature that a *supportive organisational climate* plays an important role in ensuring the successful introduction of these practices. Research aimed at demonstrating its role, and the mechanism of action by which it influences these desired outcomes is far harder to find. The above models demonstrate that a *supportive organisational climate* can lead to greater adoption of the desired behaviours, but has no direct impact on either the behaviour in question or *attitude to research*. A *supportive learning climate* can ensure that people are provided with the time, access and authority they need to locate, review and implement research evidence into their day-to-day work. In the clinical environment the longer history of this practice is more likely, as predicted, to mean that a supportive climate will lead to the resources needed to adopt such an approach. Managers will have greater awareness of what those resources ought to look like and how they can be delivered in practice.

Over and above its positive impact on extrinsic PBC, a *supportive organisational climate* can also have an impact *on perceived improvements* arising out of the adoption of these approaches. It also has negative impact on the *political utilisation of research evidence,* particularly in the clinical management group. It appears that when people operate in a *supportive organisational climate*, they are less likely to engage in such divisive behaviour. It could also be, however, that there are greater sanctions for unethical behaviour in this environment, or more processes in place to ensure that one's inappropriate behaviour is found out.

Education level is a higher predictor of critical appraisal skills in the clinical management group, where the education received is far more likely to be tailored to developing the necessary critical appraisal skills, than those in the general management population. Education levels predicts *attitude to research* very weakly and indirectly via its impact on *critical appraisal skills*, which in turn predicts *improvements* and thereby has an impact on *attitude to research.*

There is strong evidence to suggest that education level becomes less important in terms of strategic decision making (as with grade) as the adoption of an evidence/research-based approach to decision making becomes more widespread. Both *education level* and *grade* are significantly higher predictors of decision-type in the non-clinical management group.

Outcomes from research utilisation and evidence-based practice

Improvements

People who have adopted an *evidence-based approach* to practice believe that it leads to *improvements* in their day-to-day work, across a range of work areas. Those who engage in the behaviour more often report greater improvements. Whilst both *research utilisation* and *evidence-based practice* both directly predict *improvements*, they are also indirect predictors, via their impact on the development of *critical appraisal skills*. *Organisational learning climate* predicts *perceived improvements* over and above its impact on *extrinsic PBC*; possibly due to such factors as increased transfer of learning, greater support for innovation etc. Only those people in higher grades differ significantly in the regression weights from *research utilisation* (and the *adoption of EBP*) to *perceived improvements.* The model controls for time, access and authority which one might suppose were the key reasons for this difference, so evidently there are additional factors which explain why the adoption of (at least these) behaviours in higher graded posts leads to greater improvements.

Decision type

Both the adoption of evidence-based practice, and *research utilisation* appear to promote more strategic decision making. Grade is a significantly stronger predictor of strategic decision making in the non-clinical management group. This would support the hypothesis that the adoption of a research/evidence-based approach encourages greater meritocracy, where a higher number of people are involved in the decision making process, regardless of grade. Grade is also a significantly stronger predictor of strategic decision making where people undertake less CPD. The suggestion is that those who are less intrinsically motivated to improve their performance involve themselves in more demanding decision making only when their grade demands it. It could be the case, however, that people who undertake less CPD work in climates that are less supportive of learning and encouraging wider involvement in the decision making process.

8.3 Implications for Practice

There is a growing expectation that both medical and policy decision making be more transparent and evidence-based decision making has been proffered as a means to address this growing demand. It seems reasonable to propose that healthcare managers, as well as clinicians, ought to utilise research evidence, where it is available, to inform their decision making. It is also reasonable to expect that some managers will be sceptical about whether the time and effort required to access and translate research findings into practice, will be justified by the results obtained. This research suggests that both research utilisation and research-based decision making lead to positive outcomes in people's day-to-day work, as well as increasing the likelihood that the individual will become more engaged in the strategic decision making process. As with previous research, this study suggests that a direct translation of research evidence into significant, practical action in the workplace is less common than what Webber (1991) describes as the 'enlightenment' use of research. The latter's effect on policy decisions is more difficult to quantify. Here research evidence is used to gain a better understanding of problems and to keep one's professional knowledge base updated, rather than being directly related to a specific policy decision. Respondents, both clinical and non-clinical managers, describe research evidence being translated into significant, practical action only occasionally. However, one should not overlook the impact of the less direct application of research evidence in generating improvements over the long term.

Both *utilisation of research evidence*, and the *adoption of evidence-based practice* also appear to lead to the development of a *positive attitude towards* *research use*, particularly when the organisation provides the circumstances that translate this positive assessment into action. The question then arises of how such an approach may be encouraged within the organisation where these outcomes are desired.

Nutley and Davies (1999) note that encouraging research-based practice requires one also to consider the diffusion of an ideology: one that stresses the importance of using research evidence when making decisions about service practice. They believe that the objective is to win over the hearts and minds of practitioners so that they adopt a frame of reference that values research evidence.

Groups with a longer history of research use are more positive about its benefits; engagement in the activity is critical in winning over hearts and minds. We find, however, that where opportunities to engage in this practice are fewer, a positive attitude is far less likely to lead to research utilisation. The motivation to turn a positive appraisal of a given activity into action requires organisational interventions in terms of providing the value system and the opportunities which support these behaviours.

Another important question raised by Nutley and Davies is whether there are particular forms of organisation and management that enable or inhibit research utilisation. The effect of organisational learning climate is subtle and indirect. It is generally suggested that innovations are adopted more readily in organisations where such a climate prevails. This model would suggest that it had an indirect mechanism of action via its impact on extrinsic perceived behavioural control, in that a supportive learning climate can encourage research/evidence via its provision of the requisite resources: time, access and authority. Its impact upon intrinsic motivation appears to be via these levers. A supportive learning climate can also generate greater improvements arising out of the adoption of a research/evidence-based approach, perhaps due to the opportunities created for greater transfer of learning, greater team working or better leadership skills. It was interesting to find that an unsupportive learning climate can increase the political use of research evidence, perhaps people feel less commitment to the values of the organisation in such a climate, or it may be that the values are less clear or are even supportive of such behaviour.

A management style based on demands and threats (although potentially achieving short term compliance) has a negative effect on the individual's attitude towards research utilisation and evidence-based practice. They are therefore unlikely to be intrinsically motivated to engage in these behaviours, in the absence of external pressure. This research has shown that some managers adopt a threatening and demanding management style in order to meet organisational objectives and elicit expected behaviours, and the indications are that these results can be achieved if we look purely at the outcome measures. The use of the comprehensive nonrecursive model, however, leads one to suggest that long-term this management style will decrease intrinsic motivation towards the expected behaviour and the organisation may become increasingly reliant on extrinsic motivators to achieve these results. This is the implication from the analysis; it would, however, require further research to confirm this provisional finding.

The danger is also that having a negative effect on an employee's attitude to research can also lead to the political utilisation of research evidence. This is problematic for the organisation as it means that research evidence is withheld when it does not meet the political aims of those in positions of authority, or is manipulated to justify decisions made on other, generally political, grounds. If one of the purposes of evidence-based decision making is the replacement of ideology and political reasoning with science, then the environment into which the practice is introduced is key; otherwise research use may be employed to serve political ends of those with greater power, rather than serving to reduce this behaviour.

Attempting to link research use and/or evidence-based practice to extrinsic rewards in order to encourage these behaviours can have the reverse effect via their negative impact on attitude to research. If extrinsic rewards are to be offered it must be recognised that these are difficult to introduce effectively. Either a perceived lack of procedural fairness, or the impact of extrinsic rewards on intrinsic motivation, can lead to the rewards being an expensive way of having the opposite effect to that which was intended. Certainly the evidence in all of the groups tested is that organisations have not tackled this issue successfully.

It would appear, therefore, that as well as considering those factors that can support the introduction and increase the engagement in these desired behaviours, it is also important to consider those factors that might militate against this, or which can contribute to unintended consequences.

Verbal encouragement appears to be important in eliciting the desired behaviours via its positive impact on attitude to research, although clinical groups, even with a longer history of evidence-based practice, have been no more successful than non-clinical teams in persuading people that increasing their research expertise will enhance their promotion prospects. Of course, there may be the danger, suggested by this analysis, that, having controlled for 'aspirations', those people who do not seek promotion may be more inclined to avoid or reduce their engagement in these desired behaviours. This is a very small effect, however, and the advantages of positive verbal reinforcement outweigh this potential negative side-effect.

Certainly an important issue for non-clinical managers, and clinical practitioners, is the need to increase their belief that they have the requisite authority to implement their research findings into practice. Increased mastery over external factors and increased self-efficacy can develop from engagement in the activity. However, people in lower grades do not appear to believe that they develop increased mastery over the external environment through increased use. It may be that in lower-graded groups there are more obstacles in the way of finding the time, access and authority to implement such an approach. Increasing skill levels, either through encouraging engagement in the activities or via such programmes as CASP, has a direct impact on the extent of improvements gained through involvement in the activity. People with higher skill levels, unsurprisingly, generate more positive outcomes from their research/evidence utilisation.

However, the majority of respondents described their critical appraisal skills as only 'fair'. Zaltman (1982) cautioned nearly 25 years ago about ignoring the abilities and attributes of the individual research user, perhaps reflecting the UK's generally low mathematical skills. There seems to be some way to go, therefore, if organisations are to maximise their investment in the implementation of research-based practice. In addition, there also appears to be a need to ensure that research evidence is provided in a more readily accessible format. In this respect, clinical practitioners are some way ahead of the general management population. It is certainly conceivable that professional journals, especially those aimed at general managers, could provide a greater focus on quality research evidence and its implications for practice. Mykhalovskiy and Wear (2004) stress that there is no shortage of material for social science decision making, and the world wide web and other electronically mediated forms of communication have an important role as conduits of evidence which is organised in such a way that it is relevant and easily accessible as well as timely. Of course, researchers must also have a greater awareness of the problems faced in the day-to-day work of both clinical practitioners and general managers if they are to provide useful research evidence to inform practice. Too often research has focused upon that which is most easily testable, rather than trying to grapple with complex real world problems faced by managers.

Exposure to the behaviour in question appears to diminish the importance of more stable intrinsic personality variables that might otherwise impact upon one's attitude towards that behaviour. Need for complexity is still an important variable, however, in accounting for the extent of respondents' strategic decision making, even having controlled for grade. In recruiting people to occupy posts where strategic decision making is an important component of the role, then this sub factor of 'need for cognition' may be an important predictor of an individual's effectiveness in such a role.

This research directs us away from considering barriers and facilitators of research utilisation in isolation from other factors, and is able to assess the relationships and relative importance of the variables included in the model when considered simultaneously. The importance of social norms and one's personal assessment of the behaviour, as well as personality variables, need to be considered alongside respondents' perceptions of barriers to the adoption of such an approach. The barriers are undeniably there, but considering them in isolation has magnified their importance. Greater exposure to the behaviour will also reduce the impact of these perceived barriers, given a supportive organisational climate.

Clinical and General Management Decision making

Denny (1999) has argued that evidence-based medicine should be regarded as an 'ideological resource' that the medical profession uses to buttress its authority, primarily by reinforcing the scientific character of medical practice. An opposing perspective is offered by Rappolt (1997), who argues that the promotion of evidence-based practice guidelines should be interpreted as part of government's efforts to restrict both the economic and clinical autonomy of the medical practitioner. Obviously the relationship between research evidence in clinical decision making, where it overlaps (as it almost always does) with more general managerial decision making can be a source of conflict and involve the exercise of power by the most dominant players; something which evidence-based decision making was intended to reduce.

There has been the suggestion from the medical community that general managers lack the skills necessary to conduct and interpret evidence-based research. This is the reason frequently given for the general management population lagging someway behind in their use of research evidence in their day-to-day decision making. Certainly there may be some truth in this, but it is also the case that clinical managers fail to recognise the different types of evidence required by general managers. If both communities had a greater awareness of these differences then, I would suggest, more effective decision making could prevail throughout the organisation. I mentioned in the literature review that healthcare managers find their inability to influence the strategic decision making process particularly stressful; this research suggests that the adoption of an evidence-based approach to practice may be a way to overcome this if we better understand their information needs and the way in which evidence is applied in practice.

Black (2001, p. 277) states that 'evidence-based policy is not simply an extension of EBM: it is qualitatively different.' Similarly, Dobrow *et al* (2004), make a distinction between a 'philosophical-normative' orientation to what constitutes evidence, and a 'practical-operational' orientation. The former, they suggest, is most frequently employed by the medical practitioner, and constitutes evidence unconstrained by context; simply addressing what sources of evidence would be most ideal for justifying a decision. The latter, they believe, is context based (i.e. with evidence defined with respect to a specific decision making context). This is the form of evidence most frequently employed by general managers. Achinstein (2001) makes the point that this evidence is subjective with different perspectives producing different explanations for the same decision outcome. Here, Postman (1999) notes that evidence may simply describe the state of knowledge at a particular time and place.

This is not to suggest that evidence has no place in policy decisions, only that we must better understand the contextual features of broader policy environments. It is also, I would suggest, overly simplistic to suggest that clinicians are concerned exclusively with a 'philosophical-normative' orientation to evidence, whilst general managers concern themselves only with a 'practical-operational' orientation. That said, however, general managers would benefit from better understanding of the evidence hierarchies utilised by clinicians, and clinicians would be better served by understanding the wider context in which general managers make their decisions. As Dobrow *et al* (2004 p. 207) comment, 'In contrast to the philosophical-normative orientation, the practical-operational orientation defines evidence less by its quality, and more by its relevance, applicability or generalisability to a specific context', (these could, of course, be considered dimensions of quality), for example, incorporating information on ethnic and cultural differences regarding patient acceptability of a specific intervention. Evidence may also be obtained on the degree of political support for a particular intervention, which can influence the amount of formal and informal support for the intervention, and almost certainly having an impact on the success or otherwise of the intervention under consideration. Greater use of qualitative evidence may be of benefit in this respect. We cannot deny that different types of decision making contexts affect what is seen to constitute evidence. A greater understanding of the contextual issues affecting an intervention's success can also feed back into the evidence-base to inform future decisions. It may be possible to promote a better relationship between the different types of decision makers (and the evidence they require) if we can achieve a situation where evidence-based decisions are made on the best quality evidence possible, which includes a full consideration (evidence gathering) of the context in which the decision is to be implemented. It is obvious to most general managers that the same evidence, in different contexts, can often produce quite different outcomes. We need a better understanding (i.e. contextual evidence) of the generalisability of evidence generated from the philosophical-normative perspective, the contextual features of broader policy environments.

It is also important to stress that any research which aims to develop evidence which is generalisable needs to be based on well-researched and relevant theoretical and philosophical foundations. Both managerial and clinical decision makers need not only to understand the specific skills involved in making sense of research evidence, but also a greater awareness of the theoretical assumptions underpinning the research design and methodology. I am stopping some way short of suggesting that decision making ought to be seen as an art as well as a science; I am proposing that more contextual evidence is required to make such decision making more successful, transparent and cost effective, as well as, hopefully, reducing the number of decisions made on the basis of what benefits those who can exert more power over the process.

Finally, of course, the question arises about whether or not the organisation wishes to encourage this behaviour, which could potentially have negative as well as positive outcomes. Do organisations genuinely want to involve their management population in strategic decision making where they can supply the evidence to support their proposals? Many organisations may not be ready for what could be seen as a shift in power away from authority conferred by grade, to one conferred by very specific knowledge and skills. There may also be legitimate reasons for questioning the introduction of such an approach, particularly where cost and resource implications are high; where there is a general consensus about what needs to be done; or where political decisions are likely to override any objective evidence. Of course, there will always be the argument that decision making is too chaotic and political a process to be heavily reliant upon research evidence. Requests that there be greater use of research evidence in informing healthcare policy has met with criticisms reminiscent of some of the scepticism about evidence-based medicine. Yet, as Davies and Nutley (2000) suggest, the aims are often far more modest than the term 'evidence-based' might imply. 'Evidence-informed' may be a better description, and there is certainly evidence from this research to suggest that such an approach can generate improvements in day-to-day decision making, and can involve more people in the strategic decision making process.

Davies and Nutley (2001, p. 86) alert us, however, to the fact that the use of evidence is just one imperative in effective policy making...policy making itself is inherently political. The authors prefer the term 'evidence-aware' to reflect what they believe is a more realistic view of what can be achieved. They suggest that if evidence is to have a greater impact on policy and practice then four key requirements are necessary:

1. Agreement as to the nature of evidence.
2. A strategic approach to the creation of evidence, together with the development of a cumulative knowledge base.
3. Effective dissemination of knowledge; together with development of effective means of access to knowledge.
4. Initiatives to increase the uptake of evidence in both policy and practice.

I shall return to these issues later when I consider the role of continuing professional development in promoting evidence-based or 'evidence-aware' decision making.

Firstly, the above requirements lead one to the inevitable question; what counts as valid evidence in managerial/policy decision making? A plethora of suggestions exist, although there are no explicitly agreed standards. For example, a framework for appraising the quality of qualitative interventions was produced by researchers at the National Center for Social Research on behalf of the Cabinet Office Strategy Unit (http://www.policyhub.gov.uk). They suggest four guiding principles:

Contributory in advancing wider knowledge or understanding.

Defensible in design by providing a research strategy which can address the research questions posed.

Rigorous in conduct through the systematic and transparent collection, analysis and interpretation of qualitative data

Credible in claim through offering well-founded and plausible arguments about the significance of the data generated.

Eighteen appraisal questions are suggested which are intended to assess the extent to which these guiding principles have been met. The authors note, however, that, 'The questions are phrased as open-ended questions to reflect the fact that appraisals of quality must allow judgement, and that standards are inevitably shaped by the context and purpose of assessment'. The paper does not, however, address the issue around the synthesis of evidence i.e. on what basis can initiatives or interventions be appropriately combined in the way that meta analysis forms the gold standard in quantitative research?

Clancy and Cronin (2005, p. 151) note that policy making happens within a social context which changes rapidly, 'The evidence based (research) has difficulty keeping up with these changes, so by the time the evaluation, report or study has been published, things have moved on. This implies the need for a formative rather than summative research methodology'. I would suggest, however, that the theories underpinning the research, the mechanisms or levers that actually bring about (or fail to bring about) positive change, are less transient. Initiatives may be regarded as 'old hat', but if they were based on sound theory, then can we not extrapolate the evidence on that basis, thus developing a cumulative knowledge base?

Pawson (2004, p. 11) provides a convincing argument that the standards for assessing the quality of a given piece of research, 'are prone to complexity, abstraction, contradiction, imbalance and fragmentation' and that 'boundless standards do not make for expedient inclusion criteria.' His belief is that research synthesis should occur between paradigms rather than within them, and that this synthesis requires the identification of evidence from a variety of sources.' He gives the following examples: quantitative, qualitative, comparative, historical, legal, administrative, tacit, etc. He goes further, and suggests a fresh approach to evidence-based policy; that of 'realist synthesis.' He writes, (2001, p.4) 'Realist synthesis utilises a 'generative' approach to causation. According to this perspective it is not 'programmes' that work; rather it is the underlying reasons or resources that they offer subjects that generate change.' He draws upon the work of Pawson and Tilley, 1997) and suggests that the causal power of an initiative or programme lies in its underlying mechanism of action; i.e. the theory explaining *why* a given initiative ought to change people's behaviour. Pawson recognises that whether this mechanism is triggered will depend upon the context in which the initiative is introduced; the characteristics of those whose behaviour the initiative is intended to change, as well as the environment in which the initiative is introduced. He writes,

'In fact, it is not programmes that work but the resources they offer to enable their subjects to make them work. This **process** [author's emphasis] of how subjects interpret the intervention stratagem is known as the programme "mechanism" and it is the pivot around which realistic evaluation revolves.....Since it is "programme mechanisms" that trigger change rather than "programmes" as such, then it is much more sensible to base any systematic review on "families of mechanisms" rather than on "families of programmes." ' (p. 6)

We are no longer concerned with 'best practice' as such. Both successful and unsuccessful initiatives have something to teach us about the context in which such initiatives are likely to be successful and when they appear destined to fail; they identify, in effect, the scope of the theory i.e. under what circumstances do the mechanisms trigger change, and when will they be unsuccessful. I shall give an example from my own research considering the variable 'extrinsic rewards'.

The theory would suggest that rewards may have a negative impact on encouraging the desired behaviour, and that this mechanism of action could be stated very bluntly as follows:

1. Rewards will discourage the behaviour it is intended to promote where it has a negative impact upon the individual's attitude towards that behaviour; essentially the individual believes that if she/he requires extrinsic rewards to encourage this behaviour, then it cannot be motivating in itself, and intrinsic motivation will fall.

2. The theory suggests that extrinsic rewards can have a negative effect on motivation if handled incorrectly, for example, if the individual feels that the objectives he/she needs to achieve to obtain the rewards are not within their control. It is difficult to know whether the *rewards* are reducing intrinsic motivation (as they provide external justification for the behaviour) or whether the *rewards* are failing to promote *research utilisation* because there is felt to be a lack of procedural justice in the way they are administered. Both of these

theories are concerned with how the individual interprets the incentive, i.e. the sense-making process they undergo which is a key factor in determining whether or not a programme or initiative will succeed or fail.

This study points to the importance of grade in considering the effect of rewards on changing behaviour. People who lack to wherewithal to produce the required behaviour change are significantly more likely to be demotivated by attempts to reward that behaviour. This demonstrates an important contextual factor, and demonstrates a limitation on the above-mentioned theories. This could be only a tentative suggestion at this stage; the findings would be synthesised with other research from a variety of domains and methodological approaches, which also attempted to test the theory that rewards can discourage the desired behaviour for the reasons outlined above. This piece of research would suggest that an individual's grade is an important factor and sets limits upon the extent to which the theory can be generalised. This takes us away from the idea of 'best practice', and focuses instead upon the questions surrounding the development and scope of the theory.

Pawson et al (2004, p. iv) write 'Attempts to measure whether they [the interventions] work using the conventional armoury of the systematic reviewer will always end up with the homogenised answer "to some extent" and "sometimes"...Instead the aim of realistic review is explanatory what works for whom, in what circumstances, in what respects, and how?' The realist approach has no preference for qualitative or quantitative methods, but in learning and synthesising the evidence from both. The authors note that different aspects of an intervention may be uncovered through different modes of enquiry. They suggest that it is useful to think of quality appraisal of the evidence as occurring in stages:

Relevance – does the research address the theory being tested?
Rigour – does the inference drawn by the researcher have sufficient weight to make a methodologically credible contribution to the test of the theory?

Of course, such reviews do not provide definitive answers for policy makers, but serve as guidance. Managers who are provided with this information from reviewers need to have a set of skills which will enable them not only to work with the specialist reviewers to identify what it is they are trying to achieve through the proposed intervention, but also have a sufficient awareness of the issues in order to translate the findings into appropriate action. It requires far greater knowledge and skills on behalf of the researchers and the line managers, as well as attitudinal change. There is, however, the suggestion from research undertaken by Dobbins *et al* (2001) that the more healthcare managers had access to these systematic reviews, relevant to their decision making, the less they perceived critical appraisal skills to be one of the most significant barriers to using research evidence in decision making. Managers have, all too frequently, become accustomed to following to the letter the latest fad proposed by management consultants, which are rarely theory driven, and which offer the policy maker an easier solution in the eternal quest to be 'seen to be doing something'. Systematic reviews may be presented in easily understood ways to decision makers, but this should not be at the expense of developing the critical appraisal skills needed by healthcare managers to be partners with researchers in defining and evaluating such reviews.

Implications for the CPD of Healthcare Managers

I return to the earlier points made by Davies and Nutley (2001) who state that we must also concern ourselves with the effective dissemination of information, together with development of effective means of access to knowledge and initiatives to increase the uptake of evidence in both policy and practice. My suggestion is that these goals can only be met if the adoption of a 'realist synthesis' approach sits within a comprehensive information management framework which encourages professional development via critical reflection.

Like many organisations, the NHS speaks of making the case for knowledge management systems to capture and disseminate the learning and tacit knowledge generated through work. (http://www.nelh.nhs.uk/knowledge_management) The NHS Modernisation Agency is developing a knowledge management skills toolkit, which essentially identifies the competencies individuals in various posts and grades will need to develop if the envisaged system is to operate effectively. The intention is that this work is outsourced to TFPL, an international management services company that has developed a knowledge and information management competencies framework. The current plan is that these generic competencies be adapted and refined to specifically meet the needs of the healthcare employees. Presently the competencies are defined at four different levels: strategic leader, team leader, team member and all employees.

Although extensive, the competencies are aimed at ensuring staff know how to use, and are supportive of, the KM system. Yet healthcare professionals frequently suffer from competency overload. One is tempted (guided by Pawson) to ask the following questions:

What theories would explain the employment of competencies to improve individual performance; when does it? For whom? And under what circumstances? One might hypothesise, for example, that competencies are only useful when one is new to the role, or the role changes. One might also ask about the theories that would suggest that the introduction of a knowledge management system would reap individual and organisational benefits. Again, is there any evidence that might limit the scope of these theories?

The competencies developed by TFPL also appear to confuse what is meant by knowledge and what is meant by information; no clear distinction is made. I am, however, in agreement with Wilson (2002 p. 2) who argues that, ' "knowledge" is defined as what we know: knowledge involves the mental processes of comprehension, understanding and learning that go on in the mind and only in the mind....everything outside the mind that can be manipulated in any way, can be defined as "data", if it consists of simple facts, or as "information", if the data are embedded in a context of relevance to the recipient...Knowledge can never be managed except by the individual knower and, even then, only imperfectly.' Wilson is scathing about the suggestion that tacit knowledge can be captured and managed, as the NHS suggest. Tacit knowledge is hidden knowledge, hidden even from the consciousness of the knower; in what sense, he asks, can it be captured?

Essentially, the NHS is talking about the development of an information management system. The process of translating this knowledge happens within the heads of the individual employees, and is better understood, I will argue, through the process of critical reflection upon learning. Information systems are limited to providing the most up-to-date, comprehensive and reliable information in a timely fashion to the relevant people, as well as, hopefully, providing a variety of mechanisms for sharing that information and gathering new inputs. This may consist of databases, details of policies and processes, systematic reviews, group intranets etc. The application of this information can then, hopefully, be translated into useful knowledge by the individual and used in pursuit of the organisation's goals. The system cannot capture how people interpret the information, how they make sense of it within their current framework of belief (the process by which the information become knowledge) and how they then decide upon its relevance in guiding behaviour. As we have no way of managing this process, how might one ensure that the most reliable and valid information was used, that it was understood, that the way it guided action was appropriate? The process of critical reflection may offer a solution.

Haigh (1999, p.1) defines critical reflection as 'thinking about an experience with the intention of deciding what it means, how it can be explained and what the meaning and explanations might imply for the future.' So often reflection upon learning is focused upon specific, often pre-determined CPD activities, identified against a set of competencies, and is merely a statement of what one learned and how it was put into practice; it is rarely *critical* reflection, despite being described as such. To engage in critical reflection requires 'a moving beyond the acquisition of new knowledge and understanding, into questioning [of] existing assumptions, values, and perspectives.' (Cranton 1996, p. 76). Reflection in and on action on an-ongoing basis can encourage professionals to critically examine their own framework of beliefs that underpin their day -to-day actions and decision making and therefore ought to be central to CPD: identifying successful strategies and the limitations of those strategies, as well as development needs, at individual, team and organisational levels. Presently CPD operates very much at the individual level. There is also the suggestion, frequently ignored in traditional CPD processes, that reflection should be geared towards double, rather than single loop learning (Argyris and Schon, 1974 p.19). They write, 'In single-loop learning, we learn to maintain the field of constancy by learning to design actions that satisfy existing governing variables. In double loop learning we learn to change the field of constancy itself.' Essentially, in single loop learning, with its focus on the means-end effectiveness of action, the practitioner may be focused upon doing the wrong things correctly.

Practitioners could better integrate CPD and learning in practice if they were encouraged to reflect upon critical incidents in their work on a daily basis, and maintain a 'critical incident journal', or undertake what Sanders (2003) describes as 'significant event reviews (or audits)'. Sanders (p. 121) describes the important features of a significant event audit. 'First, the term significant event has a wide definition that includes any event that is thought by anyone in the team to be significant in the care of patients or the conduct of practice. These events do not necessarily have to have an adverse outcome and can also include clinical and administrative aspects of care. Second, the process of discussion considers both the positive aspects [of the event] and aspects needing improvement.' It is also important to note that the discussion provides the opportunity for individuals to examine their own perceptions and to have these challenged within the multidisciplinary team. Sanders writes, 'events deemed to be significant by team members are discussed in a solution/action centered way that does not attribute blame and where success is celebrated. The result is that the culture is developed that allows true organisational learning, in which underlying assumptions and values can be challenged and fundamental changes are made to the procedures by both individuals and the team.' A good deal has been written about the critical incident as the trigger for reflection, although as Rolfe et al (2001) note, a single definable incident may not be the trigger. Instead reflection may occur with a collection of incidents, a whole history of a relationship with a group of patients etc. Remarks made by colleagues at meetings, journal articles, new learning from an external programme, may all be triggers. Again, it is important that this reflection upon such incidents is not only done in isolation, but also tested with colleagues. I would suggest that this greater focus upon refection in and about practice, the encouragement of double loop learning, of challenging basic premises and beliefs, the recognition of the importance of feedback and challenges to our thinking from colleagues and across multidisciplinary teams) ought to sit alongside the introduction of evidence-based practice, if its introduction is to be successful. The development of critical appraisal skills in isolation from practice, and from an effective information management system, may explain the lack of impat that such skills have on research seeking and use. It could be that argued that the present benefits of teaching critical appraisal skills (outside of these frameworks) may be too small to justify devoting CPD time to them.

CHAPTER 9

9.1 Extent to which the research objectives have been met

The research, although guided by theories of research seeking and utilisation, was quite distinct in terms of the methodological approach adopted, and required that I started with a number of previously untested assumptions: specifically, that it would be possible to identify nonrecursive models predicting research utilisation, research seeking, and evidence-based decision making. Criticisms of self-report, cross-sectional methodologies are well understood, yet we rarely discuss the advantages of such an approach. Rather than being seen as a 'poor relation' to longitudinal research, nonrecursive models may enable us to suggest cause and effect, from a more sophisticated analysis of the correlational relationships between variables. This research was an attempt to overcome these difficulties and suggest an alternative methodology. Multi-trait multi-method approaches could even provide the opportunity to identify and control for, common method variance in self-report questionnaires. If one had been able to observe the behaviours directly, rather than rely on self-reports, then the regression weights between the predictor variables and the behaviours are likely to have been lower, although I would expect to find the same pattern of relationships between the variables as the model is well-fitting across all of the sub-groups tested.

It is, however, important to stress that the research methodology is in its infancy. Ideally, I would like to have been able to compare findings from this analytical method, to those obtained in a longitudinal study, in those (very few) instances where the circumstances of a given intervention permits. We need a far better understanding of the way in which the identification of the variables affects the regression weights, and also whether the instrumental variables chosen can affect the results obtained.

Performance of the scales

This is a problem faced by all researchers engaged in structural equation modelling. When deciding which scales to use in the model one must be aware that most scales have been developed using exploratory factor analysis rather than the more rigorous confirmatory factor analysis reported by SEM practitioners. I found that many of the chosen scales did not perform as expected, and it was necessary to choose those items that were well fitting. Often one finds that scales that were presumed to be unidimensional actually contain sub-factors when subjected to confirmatory factor analysis (CFA). The Attitude to Research Scale, Need for Cognition Scale, and Organisational Learning Scale all performed particularly poorly.

One must be aware, however, when scales are reduced to a smaller number of items to ensure unidimensionality, the construct one started out attempting to measure may be subtly altered. It is important, therefore, to ensure that the items used are reported so that the reader might make up his/her own mind about the construct employed in the model. In the case of need for cognition, for example, I found that the sub-factors performed quite differently. Most research to date considers need for cognition as a unidimensional construct, yet I found that only 'need for complexity' proved an important predictor of both research and evidence utilisation, as well as the extent to which the individual engaged in strategic decision making.

A further point is that the regression weights in some of the scales used in the model are lower than one would have hoped, despite the fact that these scales have been frequently employed in research as unidimensional constructs. Certainly a greater focus on scale development, employing confirmatory factor analysis, is required more generally.

Ideally, I would also have liked to have included scales related to *'perceived improvements'* arising out of both *research utilisation* and *research seeking,* rather than including just the one scale which focused specifically upon improvements arising out of the adoption of evidence-based practice. There is the suggestion in the models that attitudes towards research are altered by improvements (or lack of improvements) arising out of the behaviours considered, but it was only possible to test this in the case of the *adoption of evidence-based practice.*

Exact versus close fit

Although this topic rarely appears in the research literature, there has been an ongoing debate amongst researchers in the 'on-line' structural equation modelling community (SEMNET). The issue is unlikely to be resolved in the near future. The 'close fit' supporters argue that measures of close fit should be reported as well as the chi-square difference test, as they indicate how 'close fitting' the model is i.e. how closely it replicates the reality of what is happening in the world. They point to the limitations of the chi-square in dealing with large samples where significant chi-squares may lead to the rejection of good models. The 'close fit' tests, it is argued, permit a broader interpretation of the degree of model fit than the chi-square test, because they recognise that sample size plays a role by affecting the confidence interval associated with an estimate of model fit. Although the tests of close fit almost always provide the most liberal power figures, I have taken the position that they are generally the most useful because researchers typically hypothesise that a model fits reasonably well rather than perfectly. This is not to suggest that exact fit ought not to be our ultimate goal, but that imperfect, but useful, close fitting models can assist us in reaching that goal, as well as providing important theoretical and practical explanations and guiding future research.

Need for parcelling

Both the sample size to parameter ratio, as well as the problems associated with the scales used, necessitated the use of parcelling. Despite the justifications for parcelling, one cannot overlook the fact that the fit measures will be far better in models where such an approach has been adopted, than in those models where all items from each scale have been included. The fit measures I obtained would have been poorer where all of the items in each scale had been used. Whenever possible, I tested relationships between variables using all of the items in the scale or subscale to compare both the regression weights and whether the group differences still held true. Two of the groups 'CASP trained' and 'clinical practitioners' were very small and it was not possible to include them in the full analysis. Stratification was not possible, however, in these instances, as the

Institute of Healthcare Managers records neither of these variables. It would have been preferable to have had a larger sample size in order to test the hypotheses with the full model for all of the sub-groups.

Type II errors

Because of the need for bootstrapping outlined earlier, it is likely that important group differences have been missed because they failed to reach the requisite significance levels, establishing a clear difference between the two groups. When we take confidence intervals into account there is frequently an overlap between the scores of the groups compared. In these instances, one cannot be certain that the differences between groups are due to measurement artifacts and so it is not possible to suggest such differences would be found in practice.

9.2 Reflections on the research process

It quickly became apparent that utilising a longitudinal research design to test my hypotheses was both impractical and inappropriate due to the circumstances surrounding the introduction of the initiative I wished to explore. It also became clear that my own knowledge of the methodological (rather than the practical) problems associated with longitudinal methodology was scant, and my awareness of how to overcome these problems even more limited. It was necessary to look outside of the social science literature to explore how researchers in other disciplines had attempted to tackle similar methodological concerns.

This examination of the literature resulted in my utilising a method of analysis which was previously unknown to me and where there were few precedents to guide the research design, particularly in terms of utilising appropriate 'identifying' variables to ensure that I could identify the model which represented my hypotheses. Structural equation modelling is a complex and challenging analytical approach, which took some time to learn, not helped by the fact that there are few people who have utilised this approach in the UK, and even fewer who have attempted nonrecursive modelling. Whilst complex to learn it has greatly extended my awareness of the problems associated with the statistical approaches I had previously been taught and had applied without consideration of these issues. It has proven extremely beneficial in terms of my work role when analysing the research submitted to the National Institute for Clinical Excellence by the pharmaceutical companies to support the efficacy of medications. The far from rigorous development of the scales employed to measure such constructs as depression, anxiety, well-being etc. become immediately apparent when modelled using confirmatory analysis within an SEM programme.

The on-line support group for people who are using structural equation modelling in their research (known as SEMNET) has proven invaluable. The approach is relatively recent and new developments arise regularly, which stimulates fresh debate and highlights areas of disagreement. Many of the leading researchers in the field are members of this on-line community and have proven very willing to help newcomers such as myself to increase their understanding of this approach.

9.3 Contribution to knowledge

The research demonstrates the way in which nonrecursive structural equation modelling, an approach widely used in the economics literature, may be employed in organisational research. The methodological approach adopted provides a way in which researchers can consider complex latent variables within a path model, and also examine the inter-relationships between the predictor variables and the outcome variables, as well as their relative strengths. It allows one to take into account issues such as measurement error when assessing the reliability and validity of our measures (versus regression which assumes 100% reliability of single item measures).

Cross-sectional data can, therefore, be employed in those instances when longitudinal randomised controlled trials are impossible to conduct within an organisational setting, and where we understand very little about the time lags involved between our variables of interest. This approach provides the researcher the opportunity to model causal relationships between variables using cross-sectional data, and enables him/her to gain a better understanding of the extent to which past behaviour might impact upon future behaviour, and the mechanisms through which this occurs.

It enables the researcher to examine the extent to which data fail to agree with their proposed model of causation when it is based on explicit, viable, theory. The approach can provide the opportunity for organisational researchers to propose and test their causal hypotheses in areas that may previously have been limited to those rare occasions when the conditions for longitudinal research have been met. The analysis also provides further information on the problems of identification with respect to nonrecursive models, and how these might be overcome. It provides a starting point for researchers in thinking out the measurement of causal variables that can serve as 'identifiers' for those constructs which the researcher believes may be reciprocally related.

The research also highlights the problems associated with the development of scales to measure latent constructs. It is clear that a more rigorous approach to scale development is needed. When even well established scales are subjected to confirmatory factor analysis using structural equation modelling, their weaknesses become apparent. Whilst these problems are only just coming to be recognised in the economic and medical literature, this research highlights how little attention has been paid to scale development within organisational research. Confirmatory Factor Analysis (CFA), using an SEM programme, can be used to establish the validity and reliability of a hypothesised measurement model, and is considered one of the more rigorous scale development procedures, yet I could find no examples of its use in developing scales related to my own research, or indeed in social science research generally.

In the case of my own research, nonrecursive structural equation modelling enabled me to extend the Theory of Planned Behaviour, thereby lending it greater explanatory power as well as identifying where the assumptions inherent in the theory are incorrect. It demonstrated the ways in which the utilisation of research evidence and the adoption of evidence-based practice can influence future behaviour, as well as identifying the relative strengths of these reciprocal relationships. The ability to model reciprocal relationships in this way enables me to identify those variables that can promote or militate against the successful introduction of research-based practice, which can be considered by organisational leaders during the implementation process, or to revise current practice.

It seems difficult to argue with the idea that healthcare policy should be based on the best available evidence. It seems likely that the shift towards greater transparency and rationalisation of the decision making process in healthcare policy is likely to continue. What appears to be missing, however, is a better understanding of the specific contexts in which the decision making takes place. The proposed model was a good fit across all sub-groups when I considered the behaviours of interest, and could therefore serve as the basis for future research when considering behaviour change in organisations where longitudinal research under experimental conditions is rarely possible.

9.4 Future research directions

a. It would be useful to examine the extent to which the nonrecursive model is well-fitting across other professional groups. Whilst it was applicable to each of the sub-groups examined in this research, it is not known how generalisable the findings are outside of the healthcare arena.

b Although it would be a massive undertaking, the comparison of longitudinal research with nonrecursive models utilising cross-sectional data would shed light on the extent to which they are comparable. It would be especially useful if one were to employ multitrait-multimethod analysis to overcome the problems of common method variance in self-report questionnaires.

c. It will be useful to examine in greater detail the impact that different 'identifying' or 'instrumental' variables have on the parameter weights of the endogenous variables in the feedback loop, and how researchers might be guided in identifying and measuring appropriate instrumental variables.

d. Future research in this area will be affected by the dearth of scales that are well-fitting in the structural model. We are largely reliant upon poorly developed scales, and there is a need for increased focus on more rigorous scale development which measure those constructs of importance to social scientists working in the area of organisational research.

e. This study has shown that policy makers are attempting to use research in their decision making, and are seeing improvements as a result. However, whilst this research focused on those factors that promote or militate against the use of evidence-based practice, there is a need to better understand the research requirements of policy makers. Our understanding of evidence-based practice will need to be broader to incorporate these different requirements, and thereby generate greater improvements.

References

Abrahamson, E. (1991). 'Managerial fads and fashions: The diffusion and reflection of innovations,' *Academy of Management Review,* vol 16, pp. 586-612.

Achinstein, P. (2001). *The Book of evidence*, Oxford University Press, New York.

Ajzen, I. (1988). *Attitudes, personality, and behaviour*, Open University Press, Milton-Keynes, England, & Dorsey Press, Chicago, IL.

Ajzen, I. (1991). 'The theory of planned behavior', *Organisational Behaviour and Human Decision Processes, vol* 50, pp. 179-211.

Ajzen, I. (2002). 'Residual effects of past on later behaviour: habituation and reasoned action perspectives', *Personality and Social Psychology Review, vol* 6(2), pp. 107-122.

Allison, G. T. (1971). *Essence of decision-making*, Little, Brown and Company, Boston.

Allport, G. (1935). *Attitudes. A handbook of social psychology,* Murchison, C.A., New York.

Anderson, A., Cosby, J., Swan, B., Moore, H., Broekhoven, M., (1999). 'The use of research in local health service agencies', *Social Science and Medicine, vol* 49, pp. 1007-1019.

Anderson, H. (2001). 'What do pragmatists have to say about critical thinking?' *Educational Theory, vol* 52(2), pp. 209-220.

Anderson, S. E., Williams, L.J. (1992). 'Assumptions about unmeasured variables with studies of reciprocal relations. The case of employee attitudes', *Applied Psychology, vol* 77, pp. 638-650.

Arbuckle, J. L. (1996). 'Full information estimation in the presence of incomplete data.' In Marcoulides, G.A., & Schumacker, R.E., (eds) *Advanced structural equation modelling*, Lawrence Erlbaum Associates, Mahwah, NJ, pp. 243-277.

Arbuckle, J. L., Wothke, W. (1999). *Amos 4 users guide*, Smallwaters, Chicago.

Argyris, C., Schon, D.A. (1974). *Theory in practice: Increasing personal effectiveness,* Jossey-Bass, San Fransisco.

Argyris, C., Putnam, R., Smith, D.M. (1985). *Action science*, Jossey-Bass, San Francisco.

Aronson, E., Mills, J. (1959). 'The effect of severity of initiation on liking for a group', *Journal of Abnormal and Social Psychology, vol* 59, pp. 177-181.

Bagozzi, R. P., Burnkrant, R.E. (1979). 'Attitude, organisation and the attitude-behaviour relationship'. *Journal of Personality and Social Psychology, vol* 37, pp.913-929.

Bailey, J. R. (1997). 'Need for cognition and response mode in the active construction of an information domain', *Journal of Economic Psychology*, vol 18, pp. 69-85.

Bandura, A. (1977). *Social learning theory*, General Learning Press, New York.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*, Prentice-Hall, Englewood Cliffs, New Jersey.

Bardach, E (1984). 'The dissemination of social science research', *Knowledge, vol* 6, pp. 125-145.

Barr, R., Hinkle, S., Smith, K., & Fenton, M. (1980) 'Reactance as a function of actual versus projected utility', *Journal of Personality and Social Psychology*, vol 38, pp. 416-422.

Bas, V. (1993). 'Need for cognition and external information search: responses to time pressure during decision-making', *Journal of Research in Personality*, vol 27(3), pp. 238-252.

Bauman, K. E., Fisher, L.A., Bryan, E.S. and Chenoweth, R.L. (1985). 'Relationship between subjective expected utility and behavior: a longitudinal study of adolescent drinking behavior', Journal of Studies on Alcohol, vol 46, pp. 32-38.

Beauvois, J. L., Joule, R.V. (1996). *A radical dissonance theory*, Taylor & Francis, London.

Bem, D. J. (1967). 'Self-perception: an alternative interpretation of cognitive dissonance phenomena', *Psychological Review, vol* 74, pp. 183-200.

Bem, D.J. (1972). *Self-perception theory.* In L. Berkowitz (Ed.), Advances in experimental social psychology, Vol. 6, Academic Press, New York, pp1-62

Bennett, R., Gabriel, H. (1999). 'Organisational factors and knowledge management within large marketing departments: an empirical study', *Journal of Knowledge Management, vol* 3(3), pp. 212-225.

Bentler, P. M., Speckart, G. (1979). 'Models of attitude-behavior relations', *Psychological Review, vol* 86, pp. 452-464.

Bentler, P. M., Bonnet, D.G (1980). 'Significance tests and goodness-of-fit in the analysis of covariance structures', *Psychological Bulletin*, vol 88, pp. 588-606.

Berger, P.L., Luckmann, T. (1966). *The social construction of reality: A treatise in the sociology of knowledge*, Doubleday, New York.

Berry, W.D. (1984). *Nonrecursive causal models*, Sage, London.

Beyer, B.K. (1988). *Developing a thinking skills program*, Allyn & Bacon, Boston.

Black, N. (2001). 'Evidence-based policy: proceed with care', *British Medical Journal*, vol 323, pp. 275-279.

Bollen, K. A. (1989). *Structural equations with latent variables*, Wiley , New York.

Bollen, K. A., & Long, J. S. (1993). *Testing structural equation models,* Sage, Newbury Park, CA.

Borrill, C., Haynes, C. (2000). 'Managers' lives. Stressed to kill', *The Health Service Journal*, vol 110 (5691), pp. 24-25.

Boyd, B., Wandersman, A. (1991). 'Predicting undergraduate condom use with the Fishbein and Ajzen and the Triandis attitude-behavior models: Implications for public health interventions', *Journal of Applied Social Psychology*, vol 21, pp. 1810–1830.

Braybrook, D., Lindblom, C. (1972). *A strategy for decision*, Basic Books, New York.

Breen, R., Roger, L. (1999). 'Academic research and student motivation.' *Studies in Higher Education, vol* 24(1), pp. 75-94.

Brehm, M. L., Back, K. W., & Bogdonoff, M. D. (1964). 'A physiological effect of cognitive dissonance under stress and deprivation', *Journal of Abnormal and Social Psychology, vol* 69, pp. 303-310.

Breslin, C., Li, S., Tupker, E., Sdao-Jarvie, K. (2001). 'Application of the theory of planned behavior to predict research dissemination: A prospective study among addiction counselors', *Science Communication, vol* 22, pp. 423-437.

Briggs, S. R., Cheek, J.M. (1986). 'The role of factor analysis in the development and evaluation of personality scales', *Journal of Personality, vol* 54, pp. 106-148.

Briner, R. B. (1998).'What is an evidence-based approach to practise and why do we need one in occupational psychology?', *Proceedings of the British Psychological Society.* January 1998, London.

Broadfoot, P. (1988) 'Educational research: two cultures and three estates', *British Educational Research Journal*, vol 14(1), pp. 3-15.

Brookes, B. C. (1980). 'Measurement in information science: objective and subjective metrical space', *Journal of the American Society for Information Science, vol* 31(4), pp. 248-255.

Brown, B., Crawford, P., Hicks, C. (2003. *Evidence-Based Research: dilemmas and debates in health care,* Open University Press, Maidenhead.

Brooks, I., Bate, S.P. (1994). 'The problems of effecting change within the British civil service: A cultural perspective', *British Journal of Management*, vol 5(3), pp. 177-190.

Brown, B., Crawford, P., Hicks, C. (2005) *Evidence-based research,* Open University Press. Maidenhead.

Brown, M. N., Keeley, S.M. (1990). *Asking the right questions, A guide To critical thinking,* Prentice-Hall, Englewood Cliffs, New Jersey.

Browne, M. W., Cudeck, R. (1993). *Alternative ways of assessing model fit,* Sage, Newbury Park, CA.

Budd, R. J., Spencer, C.P. (1986). 'Lay theories of behavioural intention: a source of response bias in the theory of reasoned action', *British Journal of Social Psychology*, vol 22, pp. 107-117.

Bunce, D., Birdi, K. (1998). 'The theory of reasoned action and theory of planned behaviour as a function of job control', *British Journal Of Health Psychology*, vol 3(2), pp. 62-75.

Burdick, T., Hensing, J., Kirkman-Liff, B., Nenaber, P., Simington, M. (2005) 'Managing knowledge to improve healthcare quality in banner health.' In Gupta, J., and Sharma, S. (eds) *Creating knowledge-based healthcare organizations,* Idea Group, London.

Cacioppo, J. T., & Petty, R. E. (1982). 'The need for cognition', *Journal of Personality and Social Psychology,* vol 42 (1), pp. 116-131.

Cacioppo, J. T. F., Petty, J.A., R.E. Jarvis, B.W.B. (1996). 'Dispositional differences in cognitive motivation, in the life and times of individuals varying in need for cognition', *Psychological Bulletin,* vol 119(2), pp. 197-253.

Cacioppo, J. T., Petty, R.E., & Kao, C.F. (1984). 'The efficient assessment of the need for cognition'. *Journal of Personality Assessment, vol 48(3)*, pp. 306-307.

Caplan, N., Morrison, A. Stambaugh, R. (1975). '*The use of social science knowledge in policy decisions at the national level: A report to respondents*', Michigan, Ann Arbor. Institute for Social Research, University of Michigan.

Carpenter, P. G., & Fleischman, J.A. (1987). 'Linking intentions and behavior: Australian students' college plans and college attendance', *American Educational Research Journal vol* 24, pp. 79-105.

Champion, V., Leach, A. (1989). 'Variables related to research utilisation in nursing: An empirical investigation', *Journal of Advanced Nursing, vol* 14, pp. 705-710.

Castleman, T., Swatman, O., Fowler, D. (2005) 'Aligning multiple knowledge perspectives in a health service system: A case study', In Gupta, J., and Sharma, S. (eds) *Creating knowledge-based healthcare organizations*, Idea Group, London.

Choo, C. W. (1996). 'The knowing organization. How organizations use information to construct meaning, create knowledge and make decisions', *International Journal of Information Management, vol* 16(5), pp. 329-340.

Clancy, C.M., Cronin, K. (2005). 'Evidence-based decision-making: Global evidence, local decisions', *Health Affairs*, vol 24 (1), pp. 151-162.

Cronbach, L.J. (1957). 'The two disciplines of scientific psychology', *American Psychologist,* vol 12, pp. 671-684.

Closs, S. J., Cheater, F.M. (1994). 'Utilisation of Nursing Research', *Journal of Advanced Nursing*, vol 19, pp. 762-773.

Cockerill, A. P., Hunt J.W., Schroder, H.M. (1993). *'Performance managerial competencies'. Working Paper.* London Business School.

Cohen, A. R., Scotland, E., & Wolfe, D. M. (1955). 'An experimental investigation of need for cognition', *Journal of Abnormal and Social Psychology, vol* 51, pp. 291-294.

Cohen, A. M., Stavari, P.Z., Hersh, W.R. (2004). 'A categorization and analysis of the criticism of Evidence-Based Medicine'*, International Journal of Medical Informatics, vol* 73, pp. 35-43.

Cohen, M. D., March, J.D., Olsen, L.P (1972). 'A garbage can model of organisational choice', *Administrative Science Quarterly, vol* 17, pp. 1-25.

Colyer, H., Kamath, P. (1999). 'Evidence-based practice. A philosophical and political analysis: some matters for consideration by professional practitioners', *Journal of Advanced Nursing, vol* 29(1), pp. 188-194.

Conner, M., McMillan, M. (1999). 'Interaction effects in the theory of planned behaviour. Studying cannabis use', *British Journal of Social Psychology*, vol 38, pp. 195-222.

Coopey, J. (1996). 'Crucial gaps in the learning organization: power, politics and ideology', In Starkey, K. (ed) *How Organizations Learn*, International Thomson Business Press, London.

Corwin, R. G., Louis, K.S. (1982). 'Operational barriers to the utilisation of research.' *Administrative Science Quarterly, vol* 27, pp. 623-640.

Craig, S. C., Kane, J.G., Martinez, M.D. (2000). *Ambivalence, attitude strength, and response instability. A two-wave panel study of abortion attitudes in Florida*, Annual Meetings of the American Political Science Association, Washington.

Cranton, P. *(1996) Professional development as transformative learning: New perspectives for teachers of adults*, Jossey-Bass, San Francisco.

Daft, R. L., Lengel, R.H. (1984). 'Information richness: A new approach to managerial behaviour and organization design', *Research in Organizational Behaviour*, vol 6, pp. 191-233.

Dale, B. G., Cooper, C.L. (1992). *Total quality and human resources: an executive guide*, Blackwell Business, Oxford, UK; Cambridge, Mass.,

Davies, H. T. O., Nutley, S.M. (2000). 'Developing learning organizations in the new NHS', British Medical Journal, vol 320, 998-1001.

Davies, H. T. O., Nutley, S.M. (2001). 'Evidence-based policy and practice: moving from rhetoric to reality', *Third International, inter-disciplinary evidence-based policies and indicator systems conference* July 2001. Available at http://www.cemcentre.org. Accessed March 2005.

Dawes, M., Summerskill, W., Glasziou, P., Cartabellotta, A., Martin,J., Hopayian, L.., Porzsolt,F., Burts, A., Osborne, J. (2005). 'Sicily statement on evidence-based practice', *British Medical Council, Medical Education,* Vol 5 (1) Available at http://www.biomedcentral.com/1472-6920/5/1. Accessed Feb 2005.

Dawson, S. (1992). *Analysing Organisations*, The Macmillan Press Ltd, London,

Da Cunha, A., Paiva, E. (2005). 'Knowledge strategic management in the hospital industry', In Gupta, J., and Sharma, S. (eds) *Creating knowledge-based healthcare organizations*, Idea Group, London.

De Long, D. W., Fahey, L (2000). 'Diagnosing cultural barriers to knowledge management', *Academy of Management Executive, vol* 14(4), pp. 113-135.

Dean, J. W., Jr. Sharfman, M. P. (1996). 'Does decision making matter: A study of strategic decision making effectiveness', *Academy of Management Joumal,* vol 39(2), pp. 368-396.

Deci, E. L. (1971). 'Effects of externally mediated rewards on intrinsic motivation', *Joumal of Personality and Social Psychology*, vol 18, pp. 105-115.

Deci, E. L. (1972). 'Effects of contingent and non-contingent rewards and controls on intrinsic motivation', *Organizational Behavior and Human Performance, vol* 5, pp. 217-229.

Deci, E. L. (1975). *Intrinsic motivation*, Plenum Press, New York.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). 'A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation.' *Psychological Bulletin,* vol 125, pp. 627-668.

Delin, C. R. (1994). 'Research attitudes and involvement among medical students and students of allied health occupations', *Medical Teacher,* vol 16(1), pp. 83-97.

Denny, K. (1999). 'Evidence-based medicine and medical authority', *Joumal of Medical Humanities*, vol 20(4), pp. 247-263.

Department of Health (1991) *Research for health: A research & development strategy for the NHS*, HMSO, London, Department of Health (1991) *Research for health: A research and development strategy for the NHS*, HMSO, London.

Department of Health (1993) *A Vision for the future*, HMSO, London.

Department of Health (1993). *Report of the taskforce on the strategy for research in nursing, midwifery and health visiting*, HMSO, London.

Department of Health. (1998). *A first class service, Quality in the new NHS*, HMSO, London.

Diamantopoulos, A. W., H (2001). 'Index construction with formative indicators: An alternative to scale development', *Journal of Marketing Research*, vol 38, pp. 269-277.

Diaz, M., Sligo, J. (1997). 'How Software Process Improvement helped Motorola'. *IEEE Software, vol* 14, (5), pp. 75-81.

DiMaggio, P. J., Powell, W.W. (1983). 'The iron cage revisited; Institutional isomorphism and collective rationality in organizational fields', *American Sociological Review, vol* 35, pp. 147-160.

Dinant, G. J. (1997). 'Medicine based evidence, a prerequisite for evidence-based medicine', British *Medical Journal*, vol 315, pp. 1109-1110.

Dobbins, M., Cockerill, R., Barnsley, J. (2001).'Factors affecting the utilization of systematic reviews. A study of public health decision makers', *International Journal of Technology Assessment in Health Care'*, Spring vol 17 (2), pp. 203-14.

Dobrow, M. J., Goel, V., Upshur, R.E.G. (2004).'Evidence-based health policy: context and utilisation', *Social Science and Medicine,* vol 58, pp. 207-217.

Drife, J. Johnson, I. (1995). 'Handling the conflicting cultures in the NHS', *British Medical Journal,* vol 310(6986), pp. 1054-1057.

Drory, A. (1993). 'Perceived political climate and job attitudes', *Organization Studies*, vol 14(1), pp. 59-70.

Dunn, V,. Crichton, N., Roe, B., Seers K, Williams K. (1996). 'Using research for practise: a UK experience of the BARRIERS scale', *Journal of Advanced Nursing*, vol 27, pp. 1203-1210.

Dyson, J. (1997). 'Research: promoting positive attitudes through education', Journal of Advanced Nursing, vol 26, pp.608-612.

Eagleton, T. (1995). 'Where do Post-Modernists come from?' *Monthly Review,* vol 47, 3 July-August, pp. 59-70.

Eagleton, T. (1966). *The Illusions of Postmodernism*, Blackwell, Oxford.

Efron, B. (1979). 'Bootstrap methods: Another look at the jackknife', *Annals of Statistics* vol 7, pp. 1-26.

Eisenburger, R., Fasalo, P., Davis-LaMastro, V. (1990). 'Perceived organizational support and employee diligence, commitment and innovation.' *Journal of Applied Psychology*, vol 75, pp. 51-59.

Elliot, A. J., Devine, P. G. (1994). 'On the motivational nature of cognitive dissonance: Dissonance as psychological discomfort.' *Journal of Personality and Social Psychology, vol* 67, pp. 382-394.

Epstein, S. P., R. Denes-Raj, V. Heier, H. (1996). 'Individual difference in intuitive-experiential and analytical-rational thinking styles.' *Journal of Personality and Social Psychology*, vol 71(2), pp. 390-405.

Estabrooks, C.A., Scott-Findlay, F., Rutukumwa, W., Duan, Q., O'Leary, K., & Rozanova, J (2003). 'Individual determinants of research utilisation: a systematic review.' *Journal of Advanced Nursing*, vol 45(5), pp. 506-521.

Evidence-Based Medicine Working Group. Rada, J., Ratima M., Howden-Chapman, P. (1999). 'Evidence-based purchasing of health promotion: methodology for reviewing evidence.' *Health Promotion International*, Vol. 14, No. 2, 177-187.

Fabian, F. H. (2000). 'Keeping the tension: Pressures to keep the controversy in the management discipline', *Academy of Management Review*, vol 25(2), pp. 350-372.

Fazio, R. H., Zanna, M.P., Cooper, J. (1977). 'Dissonance and self-perception: an integrative view of each theory's proper domain of application', *Journal of Experimental Social Psychology*, vol 13, pp. 464-479.

Fear, J. A. (1991). 'CPD: Perspectives from HR professionals'. *Personnel Review*, Institute of Personnel and Development, London.

Fekadu, Z. & Kraft, P. (2002). 'Expanding the theory of planned behaviour: The role of social norms and group identification', *Journal of Health Psychology*, vol 1, pp. 33-43.

Ferris, G. R. F., Galang, M.C. Zhou, J. (1996). 'Perceptions of organizational politics; prediction, stress-related implications, and outcomes.' *Human Relations*, vol 49(2), pp. 233-256.

Ferris, G. R., Kacmar, M.K.(1992). 'Perceptions of organizational politics.' *Journal of Management*, vol 18, pp. 93-116.

Festinger, L. (1957). *A theory of cognitive dissonance.* Row, Peterson, Evanston. IL

Festinger, L., Carlsmith, J. M. (1959). 'Cognitive consequences of forced compliance', *Journal of Abnormal and Social Psychology*, vol 58, pp. 203-210.

Finkel, S. E. (1995). *Causal analysis with panel data*, Sage, Thousand Oaks, CA.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley, Reading, MA.

Fleetwood, S. (2005) *Ontology in Organisation and Management Studies: a critical realist perspective,* Working Paper. Lancaster University Management School. Available from http://www.lums.co.uk/publications/ (Accessed January 2005)

Forsyth, D. R. (1999). *Group dynamics*, Wadsworth Publishing, Belmont, Ca.

Frone, M. R., Russell, M., Cooper, M.L. (1994). 'Antecedents and outcomes of work-family conflict. Testing a model of work family interface', *Journal of Applied Psychology, vol* 77(1), pp. 65-78

Funk, S. C., M.T. Weise., R. Tornquist, E.M. (1991). 'BARRIERS: The barriers to research utilisation scale', *Applied Nursing Research, vol* 4, pp. 39-45.

Furby, L. A., Beyth-Marom., R. (1992). 'Risk taking in adolescence: a decision making perspective.' *Developmental Review* , vol 12, pp. 1-44.

Garside, P. (1999). 'Evidence-based mergers?' *British Medical Journal* , vol 318, pp. 345-346.

Garvin, D. A. (1993). 'Building a learning organization.' *Harvard Business Review:* Jul/Aug, vol 71(4), pp. 78-91.

Geisler, E. (2005), Foreword, in Gupta, J., Sharma, S. (eds*) Creating knowledge-based healthcare organizations*, Idea Group, London.

Gerard, H. B. (1967). 'Choice difficulty, dissonance and the decision sequence', *Journal of Personality*, vol 35, pp. 91-108.

Ginsberg, G. P. (1979). *Emerging Strategies in Social Psychological Research,* John Wiley, Chichester.

Girot, E. A. (2000). 'Graduate nurses: critical thinkers or better decision makers?' *Journal of Advanced Nursing*, vol 31(2), pp. 288-297.

Giullifer, J. (1997). 'The acceptance of a philosophically based research culture, *International Journal of Nursing Practise*, vol 3(3), pp. 153-158.

Gleicher, F., Boninger, D., Strathman, A., Armor, D., Hetts, J., & Ahn, M. (1995). 'With an eye toward the future: The impact of counterfactual thinking on affect, attitudes, and behavior', in Roese, N.J., & Olson, J. M. (Eds), *What might have been: The social psychology of counterfactual thinking,* pp. 283-304, Erlbaum, Mahwah, New Jersey

Goh, S., Richards, G. (1997). 'Benchmarking the learning capability of organizations', *European Management Journal*, vol 15(5), pp. 575-583.

Goodman, S.K. (1993). 'Information needs for management decision making', *Records management Quarterly,* 27 Vol 4 October, pp. 21-23.

Gottfried, A. E., Fleming, J.S., Gottfried, A.W. (1994). 'Role of parental motivational practises in children's academic intrinsic motivation and achievement', *Journal of Educational Psychology,* vol 86, pp. 104-113.

Green, J. (1998). 'Qualitative research and evidence-based medicine', *British Medical Journal,* vol 316, pp. 1230-1232.

Greenhalgh, T. (1999). 'Narrative based medicine in an evidence-based world.' *British Medical Journal*, vol 318, pp. 323-325.

Greenhalgh, T. (1997). How to read a paper: The basics of evidence-based medicine, *British Medical Journal,* vol 323(7307), Publishing Group, London.

Greenhalgh T. (2002). 'Intuition and evidence – uneasy bedfellows?' *British Journal of General Practise*, Vol 52, pp. 395–400.

Griffin, D., Tversky, A. (1992). 'The weighing of evidence and the determinants of confidence', *Cognitive Psychology,* vol 24, pp. 411-435.

Groundwater-Smith, S. (2004). 'Serving different masters? Relating evidence to policy and practice in the provision of services.' *EARJ Invited Seminar 24th June 2004 City University,* London. Available at:-

http://www.triangle.co.uk/ear/content/Groundwater-Smith_seminar_paper.pdf Accessed March 2005.

Gullifer, J. (1997) 'The acceptance of a philosophically based research culture?' *International Journal of Nursing Practice*. 3 (3), pp. 153-8.

Guthrie, J.T., Van Meter, P., McCann, A.D., Wigfield, A., Bennett, L., Poundstone, C.C., Rice, M.E., Faibisch, F.M., Hunt, B., & Mitchell, A.M. (1996). 'Growth of literacy engagement: Changes in motivations and strategies during concept-oriented reading instruction'. *Reading Research Quarterly, vol* 31, pp. 306-332.

Haigh, N. (1999). 'Teaching about reflection and ways of being reflective' Available from; http://www2.auckland.ac.nz/cpd/HERDSA/HTML/Workshop/Haigh.HTM. Accessed February 2005.

Ham, C., Hunter, D.J., Robinson R. (1995) 'Evidence based policymaking'. *British Medical Journal*, Vol 310, pp. 71-72.

Harmon-Jones, E., Brehm, J. W., Greenberg, J., Simon, L., & Nelson, D. E. (1996). 'Evidence that the production of aversive consequences is not necessary to create cognitive dissonance.' *Journal of Personality and Social Psychology, vol* 70, pp. 5-16.

Harrison, L. L., Lowery., B. Bailey, P. (1991). 'Changes in nurses' knowledge about and attitudes towards research following an undergraduate research course.' *Journal of Advanced Nursing* 16: pp. 807-812.

Hattrrup, K., Jackson, S.E. 'Learning about individual differences in taking situations seriously.' In Murphy, K.R., (ed) *Individual differences and behaviour in organizations*, Jossey-Bass, San Francisco, pp. 507-547

Haynes R.B, Sackett D.L, Muir Gray J.A., Cook D.J., Guyatt G.H. (1996).'Transferring evidence from research into practise, I: The role of clinical care research evidence in clinical decisions', *Evidence-based medicine*, vol 1, pp. 196-197.

Heracleous, L. T. (1994). 'Rational decision making, myth or reality', *Management Development Review, vol* 7(4), pp. 16-23.

Hicks, C. (1993). 'A survey of midwives attitudes to, and involvement in, research: the first stage in identifying needs for a staff development programme', *Midwifery*, vol 9, pp. 51-62.

Hicks, C. (1995). 'The shortfall in published research; A study of nurses' research and publication activities',*Journal of Advanced Nursing, vol* 21, pp. 594-604.

Hicks, C., Hennessy, D., Cooper, J., Barwell, F. (1996). 'Investigating attitudes to research in primary health care teams.' *Journal of Advanced Nursing*, vol 5, pp. 1033-1041.

Hoelter, J. W. (1993). 'The analysis of covariance structures. Goodness of fit indices', *Sociological methods and Research*, vol 11, pp. 325-344.

Hoyle, R. H., & Panter, A. T. (1995). 'Writing about structural equation models.' In Hoyle, R.H., (ed) *Structural equation modeling*, pp. 158-176, Sage, Thousand Oaks, CA.

Huberman, M. (1987). 'Steps toward an integrated model of research utilisation', *Knowledge*, vol 8, pp. 586-611.

Hughes, M., Golden, W. (2005). 'Knowing how intranets enable knowledge work.' In Gupta, J., Sharma, S. (eds) *Creating knowledge-based healthcare organizations*, Idea Group, London.

Hunt, M. (1987). 'Barriers to research utilisation', *Journal of Advanced Nursing* vol 12, pp. 101-110.

Hunter, J. E., Gerbing, D.W. (1982). 'Unidimensional measurement, second order factor analysis and causal models.' *Research in Organisational Behaviour* vol 4, pp. 267-320.

Hutcheson, G., Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models.* Sage publications, Thousand Oaks, CA.

Iselin, E. (1989). 'The impact of information diversity on information overload: effects in unstructured managerial decision making', *Journal of Information Science, vol* 15, no. 3, pp. 163-73.

Jaccard, J., & Wan, C. K. (1995). 'Measurement error in the analysis of interaction effects between continuous predictors using multiple regression: Multiple indicator and structural equation approaches', *Psychological Bulletin,* vol 117(2), pp. 348-57.

Jenkins, E. K. (1998). 'The significant role of critical thinking in predicting auditing students' performance.' *Journal of Education for Business*, vol 73(5), pp. 274-280.

Johnson, L.B. (1999). 'The politics of research-information use in the education policy arena,' *Educational Policy*, vol 13 (1) pp. 23-36

Jordan, D. (1999). 'An examination of differences between academics and practitioners in frequency of reading research and attitudes towards research.' *Journal of Leisure Research*, vol 31(2), pp. 166-172.

Judge, T. A., Locke, E.A. (1993). 'Effect of dysfunctional thought processes on subject well-being and job satisfaction', *Journal of Applied Psych*ology, vol 78(3), pp. 475-490.

Kacmar, K. M., Carlson, D.S. (1997). 'Further validation of the perceptions of organizational politics scale (POPS). A multiple sample investigation', *Journal of Management, vol* 23(5), pp. 627-659.

Kajermo, K. N., Nordstrom, G., Krusebrant, A., Bjorvell, H. (1997). 'Barriers to and facilitators of research utilisation, as perceived by a group of registered nurses in Sweden', *Journal of Advanced Nursing, vol* 27, pp. 798-807.

Keefe, K. (1994). 'Perceptions of normative social pressure and attitudes toward alcohol use: changes in adolescence', *Journal of Studies on Alcohol*, vol 55, pp. 46-54.

Kelly, G. A. (1955). *The psychology of personal constructs,* Norton, New York.

Kharbanda, O., Stallworthy, E. (1990). *Waste management towards a sustainable society,* Auburn House, New York.

Klein, R.B. (1998). *Principles and practise of structural equation modeling*, The Guilford Press, New York.

Kokis, J. V., Macpherson, R., Toplak, M.E., West, R.F., Stanovich, K.E. (2002). 'Heuristic and analytic processing: Age trends and associations with cognitive ability and cognitive styles', *Journal of Experimental Child Psychology, vol* 83(1), pp. 26-52.

Kovner, A. R., Elton, J.J., Billings, J. (2000). 'Evidence-based management' , Frontiers of Health Services Management, vol 4, pp. 3-24.

Kruglansky, A.W., Freund, T. (1983). 'The freezing and unfreezing of lay influences: Effects on impressional primacy, ethnic stereotyping and numerical anchoring', *Journal of Experimental Social Psychology*, vol 12, pp. 448-468.

Kuhn, D. (1991). *The Skills of Argument*, Cambridge University Press, Cambridge.

Kumar, P., Ghadially, R (1989). 'Organizational politics and Its effects on members of organizations', *Human Relations,* Vol 42(4), pp. 305-315.

Kuther, T. L. (2002). 'Rational decision perspectives on alcohol consumption by youth', *Addictive Behaviours, Vol* 27 (1), pp. 35-47.

Lacey, E. A. (1994). 'Research utilisation in nursing practise', *Journal of Advanced Nursing*, vol 19, pp. 987-995.

Landry, R., Amara, N., Lamari, M. (2001). 'Climbing the ladder of research utilisation', *Science Communication*, vol 22(4), pp. 396-422.

Langley, A. (1989). 'In search of rationality: The purpose behind the use of formal analysis in organizations', *Administrative Science Quarterly*, vol 34, pp. 598-631.

Langley, A. (1995). 'Between paralysis by analysis and extinction by instinct', Sloan Management Review, vol 36(3), pp.63-76.

Lazarsfeld, P. F. (1977) 'Notes on the history of quantification in sociology--trends, sources and problems', in Kendall, M. and Plackett, R. L. (eds). *Studies in the History of Statistics and Probability, Griffin,* London, pp. 213-270.

Le May, A., Andree, M.A., Alexander, C. (1998). 'Bridging the research-practise gap; exploring the research cultures of practitioners and managers', *Journal of Advanced Nursing*, vol 28(2), pp. 428-438.

Learmonth, M. (1997). 'Managerialism and public attitudes towards UK NHS managers - an exploratory study', *Journal of Management in Medicine,* vol 11(4), pp. 214-221.

Leicester, G. (1999). 'The seven enemies of evidence-based policy', *Public Money and Management,* vol 19 (1), pp. 5-7.

Levin, I. P., Huneke M.E., Jasper, J.D. (2000). 'Information processing at successive stages of decision making: Need for cognition and inclusion-exclusion effects', *Organizational Behaviour and Human Decision Processes*, vol 82(2), pp. 171-193.

Le May A., Mulhall, A., Alexander, C. (1998) 'Bridging the research—practise gap: exploring the research cultures of practitioners and managers', *Journal of Advanced Nursing*, vol 28 (2), pp.428-437.

Lewin, K. (1951). *Field theory in Social Science*, Harper and Row, New York.

Limbert, C., Lamb, R. (2002). 'Doctors' use of clinical guidelines: two applications of the Theory of Planned Behaviour', *Psychology, Health and Medicine*, vol 7(3), pp. 301-310.

Linder, D. E., Cooper, J., Jones, E. E. (1967). 'Decision freedom as a determinant of the role of incentive magnitude in attitude change', Journal of Personality and Social Psychology, vol 6, pp. 245-254.

Liska, A. E. (1984). 'A critical examination of the causal structure of the Fishbein/Ajzen attitude-behavior model', Social Psychology Quarterly, vol 47, pp. 74-80.

Losch, M. E., & Cacioppo, J. T. (1990). 'Cognitive dissonance may enhance sympathetic tonus, but attitudes are changed to reduce negative affect rather than arousal', *Journal of Experimental Social Psychology*, vol 26, pp. 289-304.

Lynne, G. D., Rola, L.R. (1988). 'Improving attitude-behavior prediction models with economic variables', *Journal of Social Psychology*, vol 128(1), pp. 19-28.

McCance, T. (1995). 'An investigation into nurses' attitudes towards research', *North Down and Arcs Hospitals Trust* (unpublished).

McCleary, L., Brown, G. T. (2003). 'Barriers to pediatric nurses' research utilisation', *Journal of Advanced Nursing*, vol 42(4), pp. 354-373.

McColl, A., Smith, H., White, P., Field, J. (1998). 'Information in practise: General practitioners' perceptions of the route to evidence-based medicine: a questionnaire survey', *British Medical Journal*, vol 316, pp. 361-365.

McKibbon, K. A. (1998). 'Evidence-based practice', *Bulletin of the medical library association, vol* 86, pp. 396-401.

Main, J. (1999). 'Using research findings in clinical practise medicine', *British Medical Journal, vol* 318, pp. 332.

Majone, G. (1989). *Evidence, arguments, and persuasion in the policy process*, Yale University Press, New Haven.

March, J.G., Simon, H.A. (1958). *Organizations,* Wiley, New York.

March, J. G., Olsen, J.P. (1979). *Ambiguity and choice in organizations*, Bergen, Universitetsfarlaget.

March, J. G. E. (1988). *Decisions and organizations,* Basil Blackwell, Cambridge.

Marcoulides, G. A., Schumacker.R.E (2001). *New developments and techniques in structural equation modeling,* Lawrence Erlbaum Associates, Mahwah, New Jersey.

Marlatt, G.A., Baer, J.S., & Larimer, M.E. (1995). 'Preventing alcohol abuse in college students: A harm reduction approach'. In Boyd, G.M., Howard, J., & Zucker, R.A., (eds.), *Alcohol problems among adolescents: Current directions in prevention research,* Erlbaum, Hillsdale, NJ, pp. 147-172.

Martensen, R.L. (1996). 'The effect of medical conservatism on the acceptance of important medical discoveries', *JAMA,* vol 276, pp. 1933.

Maruyama, G.M. (1998) *Basics of structural equation modeling*, Sage,Thousand Oaks, California.

Maslyn, J. M., Fedor, D.B. (1998). 'Perceptions of politics: Does measuring different foci matter?' *Journal of Applied Psychology* vol 83(4), pp. 645-653.

Mathieu, J. E. (1991). 'A cross level nonrecursive model of the antecedents of organisational commitment and satisfaction', *Journal of Applied Psychology* vol 76(5), pp. 607-618.

Mathieu, J. E., Hoffman, D.A., Farr, J.L. (1993). 'Job perception-job satisfaction relations: An empirical comparison of three competing theories', *Organisational Behaviour and Human Decision Processes, vol* 56, pp. 370-387.

May, N., Veitch, L., McIntosh, J. and Alexander, M. (1997). 'Preparation for practise: evaluation of nurse and midwife education in Scotland 1992.

Programmes final report', *Glasgow, Department of Nursing and Community Health*, Caledonian University, Glasgow.

Meah, S., Luker, K.A., Collum, N.A. (1996). 'An exploration of midwives' attitudes to research and perceived barriers to research utilisation', *Midwifery*, vol 12, pp. 73-84.

Meyer, J. P., Allen. N.J., Gellatley, I.R. (1990). 'Affective and continuance commitment to the organisation: Evaluation of measures and analysis of concurrent and time lagged relations', *Journal of Applied Psychology, vol* 75(6), pp. 710-720.

Meyer, J. W., Rowan, B. (1977). 'Institutionalized organizations: Formal structure as myth and ceremony ', In Meyer. J. W., & Scott, W.R. (eds) *Organizational Environments: Ritual and Rationalit, Sage,* Beverley Hills, C A, pp. 199-215.

Miller, D., Droge, C. Toulouse, J. (1988). 'Strategic process and content as mediators between organizational context and structure', *Academy of Management Journal*, vol 31(3), pp. 544-569.

Mohrman, S. A., Mohrman, Jr. (1995). *Organizational change and learning*, Jossey Bass, San Francisco.

Morrison, E. W., Vancouver, J.B. (2000). 'Within-person analysis of information seeking; The effects of perceived costs and benefits', *Journal of Management* , vol 26(1), pp. 119-138.

Muir Gray, A. (1997). *Evidence-based healthcare: how to make health policy and management decisions*, Churchill Livingstone, London.

Murauyama, G. M. (1998). *Basics Of structural equation modeling*, Thousand Oaks, London.

Mutschler, E. (1984). 'Evaluating practice: A study of research utilization by practitioners', *Social Work*, vol 29, pp. 332-337.

Mykhalovskiy, E., Weir, L. (2004). 'The problem of evidence-based medicine: directions for social science.' *Social Science and Medicine, Vol* 59, pp. 1059-1069.

Myrick, F., Young, O.J. (2001). 'Creating a climate for critical thinking in the preceptorship experience', *Nurse Education Today*, vol 21(6) pp. 461-467.

Nachmias, D. (1980). 'The role of evaluation in public policy', *Policy Studies Journal, vol* 8, pp. 1163-1169.

Nair, K. U., Ramnarayan, S. (2000). 'Individual difference in need for cognition and complex problem solving', *Journal of Research in Personality, vol* 34 (3), pp. 305-258.

Nelson, C. E. (1987). 'The utilisation of social science information by policy makers', *American Behavioural Scientist, vol 30*, pp. 569-577.

Nilsson, K., Sunesson, S. (1993). 'Strategy and tactics: Utilisation of research in three policy sector contexts', *Journal of Applied Behavioural Science*, vol 29(3), pp. 366-384.

Nisbett, R., Ross, L. (1980). *Human inference: strategies and shortcomings of social judgment,* Prentice-Hall, Englewood Cliffs, New Jersey.

Nonika, I. (1991). 'The knowledge creating company', *Harvard Business Review*, November- December, pp. 99-104.

Norrgren, F., Schaller, J. (1999). 'Leadership style: its impact on cross-functional product development', *Journal of Product Innovation Management* , vol 16(4), pp. 377-384.

Notani, A. S. (1998). 'Moderators of perceived behavioural control's predictiveness in the theory of planned behaviour: A metaanalysis' *Journal of Consumer Psychology,* vol 2(2), pp. 42-72.

Nutley, S., M. Davies, H.T.O. (1999). *Achieving evidence-based practice in public service. From dissemination to diffusion,*
Research Unit for Research Utilisation, St Andrews University.

Oh, C. H., Rich, R.F. (1996). 'Explaining use of information in public policymaking', *Knowledge and Policy*, vol 9(1), pp. 3-39.

Ovretveit, J. (1998). 'Medical managers can make research-based management decisions', *Journal of Management In Medicine, vol* 12(6), pp. 391-397.

Parahoo, K., Barr, O., McCaughan, E (2001). 'Research utilisation and attitudes towards research among learning disability nurses in Northern Ireland', *Journal of Advanced Nursing*, vol 31(3) pp. 607-613.

Parker, C. P., Dipcote, R.L., Jackson, S (1992). 'Politics perceptions: An investigation of antecedents and consequences', *Annual Meeting of the Society for Industrial and Organizational Psychology,* Montreal.

Parker, C. P., Dipcote, R.L., Jackson, S.L. (1995). 'Perceptions of organizational politics: An investigation of antecedents and consequences', *Journal of Management*, vol 21(5), pp. 891- 912.

Patch, A., Guest, D., Mackenzie-Davey, K., Kidd, J. (2000). 'What will encourage employees to acquire and share knowledge at work?' *Proceedings of The British Psychological Society Occupational Psychology Conference,* British Psychological Society. London.

Patton, M. Q. (1978). *Utilisation Focused Evaluation*, Sage, Beverley Hills.

Pawson, R. (2001) 'Evidence-based policy: 11. The promise of realist synthesis.' *ESRC UK Centre for Evidence Based Policy and Practice*. Queen Mary University of London. Pre-publication version (quoted with author's permission).

Pawson, R. (2002) 'Evidence-based policy; In Search of a Method', *Evaluation vol* 8, 2 pp. 157-181.

Pawson, R. (2004) '*Assessing the quality of evidence in evidence-based policy: why, how and when*?' ESRC Research Methods Programme. Working Paper No 1. Available from:- http://www.ccsr.ac.uk/methods/publications/Pawson.pdf. Accessed on January 2005.

Pawson, R., Greenhalgh, T., Harvey, G., Walshe, K.. (2004) '*Realist synthesis: an introduction*. ESRC Research Methods Programme'. RMP Methods Paper, University of Manchester.

Pawson, R. and N. Tilley (1997). *Realistic evaluation*, Sage, London.

Pedler, M., Boydell, T., Burgoyne, J. (1989). 'Towards the learning company', *Management Education and Development*, vol 20 (1), pp. 1-8.,

Perugini, M., Bagozzi, R.P. (2001). 'The role of desires and anticipated emotions in goal-directed behaviours: Broadening and deepening the theory of planned behaviour', *British Journal of Social Psychology*, vol 40, pp. 79-98.

Pettigrew, A. M. (1973). *Politics Of Organisational Decision Making*, Tavistock, London.

Petty, R. E., Cacioppo, J.T. (1986) *Communication and persuasion; Central and peripheral routes to attitude change*, Springer-Verlag, New York.

Pfeffer, J. (1992). *Managing with power; politics and influence in organizations.* Harvard Business School Press, Cambridge, Massachusetts.

Podsakoff, P.M. & Organ, D.W. (1986). 'Self reports in organizational research: problems and prospects', *Journal of Management,* vol 12, pp. 531-544.

Pollard, W. E. (1987). 'Decision making and the use of evaluation research", *American Behavioural Scientist*, vol 30, pp. 661-676.

Posner, G., Strike, K., Hewson, P., Gretzog, W. (1993). 'Accommodation of a scientific conception: Towards a theory of conceptual change', *Science Education, vol* 66, pp. 211-227.

Postman, N. (1999). *Building a bridge to the eighteenth century: How the past can improve our future*, Alfred A Knopf, New York.

Qian, D., Alvermann, D (1995). 'Role of epistemological beliefs and learned helplessness in secondary school students' learning science concepts from text', *Journal of Educational Psychology*, vol 87, pp. 282-292.

Quintas, P. Management First (2002) Guru interviews - Paul Quintas. Available from http://www.managementfirst.com/articles/quintas_interview.htm. Accessed 07 October 2002.

Rainey, H. G. (1983). 'Public agencies and private firms; Incentives, goals, and individual roles,' *Administrative and Society, vol* 15, pp. 207-242.

Rappolt, S. (1997). 'Clinical guidelines and the fate of medical autonomy in Ontario', *Social Sciences and Medicine, vol* 44(7), pp. 977-987.

Reed, M. (2000). 'The LImits of discourse analysis in organizational analysis', *Organization, vol* 7(3), pp. 524-530.

Reid, J. C., Klachko, D.M., Kardash, C.A.M., Robinson, R.D., Scholes, R., Howard, D. (1995). 'Why people don't learn from diabetes literature: influence of text and reader characteristics', *Patient Education and Counseling, vol* 25(1):, pp. 31-38.

Rein, M., Winship, C. (1999). 'The dangers of 'strong' causal reasoning in social policy.' *Society, vol* 36(5), pp. 38-47.

Reinecke, J., Schmidt, P., and Ajzen, I. (1996). 'Application of the theory of planned behavior to adolescents condom use: A panel study', *Journal of Applied Social Psychology* Vol. 26 (9) pp. 749–772.

Rich, R. F. (1997). *Problem solving and evaluation research. Translating evaluation into policy*, Sage, Beverley Hills.

Rich, R. F., Oh, C.H. (2000). 'Rationality and use of information in policy decisions', *Science Communication*, vol 22(2), pp. 173-211.

Rich, R. F. (2001). *Social science information and public policy making*, Transaction Publishers, New Brunswick (USA) and London (UK).

Rokeach, M. (1950). 'The effect of perception of time upon the rigidity and concreteness of thinking', *Journal of Experimental Psychology*, vol 40, pp. 206-216.

Rodgers, S. (1994). 'An exploratory study of research utilisation by nurses in general medical and surgical wards', *Journal of Advanced Nursing, vol* 20, pp. 904-911.

Rolfe, G., Freshwater, D., Jasper, M. (2001). *Critical reflection for nursing and the helping professions a user's guide,* Palgrave UK, Basingstoke, Hampshire.

Ross, R. M., McFarland, C., Conway, M., & Zanna, M. P. (1986). 'Reciprocal relation between attitudes and behavior recall: Committing people to newly formed attitudes', *Journal of Personality and Social Psychology*, vol 45, pp. 257-267.

Rossi, P., Freeman, H.E. (1993). *Evaluation. A systematic approach*, Sage, Newbury Park.

Rowley, J. (2000). 'From learning organization to knowledge entrepreneur,' *Journal of knowledge Management* , vol 4(1), pp. 7-15.

Royle, J., Blythe, J., Ciliska, D., Ing, D (2000). 'The organizational environment and evidence-based nursing', *Canadian Journal of Nursing Leadership, vol* 13(1), pp. 31-37.

Rule, J. (1971). 'The Problem with social problems', *Politics and Society* 2(1), pp. 47-56.

Rutgers, M. R. (1999). 'Be rational! But what does it mean? A history of the idea of rationality and its relation to management thought', *Journal of Management History*, vol 5(1), pp.17-35.

Sackett, D.L., Rosenberg, W.M.C., Muir Gray, J.A.., Haynes, R.B., Richardson, W.S. (1996) 'Evidence based medicine: what it is and what it isn't. It's about integrating individual clinical expertise and the best external evidence', *British Medical Journal* vol 31 (2), pp. 71-2.

Sackett, D. L., Richardson, W.S., Rosenburg, W., Haynes, R.B. (1997). *Evidence-based medicine: How to practise and teach EBM*, Churchill Livingston, London.

Sackett, D. L., Parkes, M.D. (1998). 'Teaching critical appraisal: No quick fixes', *Canadian Medical Association, vol* 158(2), pp. 203-204.

Sackett D.L., Strauss S.E. (1998). 'Finding and applying evidence during clinical rounds: the evidence cart' *JAMA, vol* 280, pp. 1336-8.

Sadowski, C. J. (1993). 'An Examination of the short need For cognition scale', *Journal of Psychology - Interdisciplinary and Applied, vol* 127(4), pp. 451-454.

Sadowski, C. J., Cogburn, H.E. (1997). 'Need for cognition in the big -five factor structure', *Personality and Cognition, vol* 131(3), pp.307-313.

Saha, L. J., Biddle, B. J., Anderson, D.S. (1995). 'Attitudes towards education research knowledge and policymaking among American and Australian school Principles', *International Journal of Educational Research*, vol 23(2), pp. 113-126.

Salaman, G. (1995). *Managing*, Open University, Buckingham.

Sanders, J. (2003). 'Significant event review and the new GMS contract: the challenge for work based learning', *Work Based Learning in Primary Care, vol* 1, pp. 119-125.

Sandler, M. E. (2000). 'Career decision making self-efficacy, perceived stress and an integrated model of student persistence', *Research in Higher Education*, vol 41(5), pp. 537-579.

Schachter, S. (1951). 'Deviation, rejection, and communication', *Journal of Abnormal and Social Psychology, vol* 46, pp. 190-207.

Schaubroeck, J. (1990). Investigating reciprocal causation ni organizational behaviour research', *Organizational Behavior*, vol 11(1), pp. 17-28.

Schneider, S. C. (1987). 'Information overload, causes and consequences.' *Human Systems management, vol* 7(2), pp. 143-154.

Schuck, G. (1996). 'Intelligent technology, intelligent worker: A new pedagogy for the high tech workplace', In Starkey, K., (Ed) *How Organizations Learn*, International Thomson Business Press, London. Pp. 199-123.

Scudder, J. N., Herschel, R. T. (1994). 'Test of a model linking cognitive motivation, assessment of alternatives, decision quality, and group member satisfaction.' *Small Group Research* 25(1): pp. 57-83.

Senge, P. (1990). 'Building learning organizations', *Sloan Management Review*, Fall, pp. 7-23.

Senge, P. (1990). *The Fifth Discipline*, Doubleday, New York.

Shadbolt, B., Wang, R. Craft, P.S. (2005). 'Moving to an online framework for knowledge-driven healthcare', In Gupta, J., and Sharma, S. (eds) *Creating knowledge-Based Healthcare Organizations*, Idea Group, London

Sharma, S.K., Wickramasinghe, N. (2005). 'e-Health with Knowledge Management: The areas of Tomorrow,' In Gupta, J. and Sharma, S. (eds) *Creating knowledge-Based Healthcare Organizations*, Idea Group, London.

Shaw, R. B., Perkins, D.N.T. (1991). 'Teaching organizations to learn', *Organizational Development Journal*, vol 9(4), pp. 1-12.

Sheeran, P., Orbell, S. (1999). 'Augmenting the theory of planned behaviour; Roles of anticipated regret and descriptive norms', *Journal of Applied Social Psychology, vol* 29, pp. 2107-2142.

Shrigley, R. L. (1990). 'Attitude and behaviour are correlates', *Journal of Research in Teaching, vol* 27: pp. 97-113.

Shrivastava, P. (1985). 'Knowledge systems for strategic decision making', *Journal of Applied Behavioural Science, vol* 2, pp. 95-107.

Simon, H.A. (1976). 'From substantive to procedural rationality,' - in Latsis, S.J. (ed) *Method and Appraisal in Economics*, Free Press, New York, pp. 129-148

Simon, H. A. (1986). 'Alternative visions of rationality', In Arkes, H., Hammond, K., (Eds) *Judgment and decision making: an interdisciplinary reader*, Cambridge Univ. Press, New York, pp.97-113.

Simpson, A.A., Joe, G.W. (2004). 'A longitudinal evaluation of treatment engagement and recovery stages', *Journal of substance abuse treatment*, vol 27, pp. 89-97.

Slocum, J. W., McGill, M., Lei, D.T. (1994). 'The new learning strategy: anytime, anything, anywhere', *Organizational Dynamics vol* 23 (2), 33-47.

Smith, G. D. (2001). 'How policy informs the evidence: 'evidence-based' thinking can lead to debased policy making', *British Medical Journal* (27)(Editorial), pp. 1-4.

Smith, J., Walshe, K. Hunter, D. J. (2001). 'The 'redisorganisation' of the NHS.' *British Medical Journal*, vol 323(7324), pp. 1262-1264.

Snyder, M. (1974). 'The self-monitoring of expressive behaviour', Journal of Personality and Social Psychology, vol 30, pp. 526-37.

Sormunen, C., Chalupa, M (1994). 'Critical thinking skills research: Developing Evaluation Techniques', *Journal of Education for Business, vol* 69(3), pp. 172-183.

Sparrow, J. (1998). *Knowledge in organisations; Access to thinking at work,* Sage, London, Thousand Oaks, California.

Straw, B. M., Epstein, L.D. (2000). 'What bandwagons bring: Effects of popular management techniques on corporate performance, reputation and CEO pay', *Administrative Science Quarterly*, vol 45(3), pp. 523-557.

Tanaka, J. S., Panter, A.T., Winbourne, W.C. (1988). 'Dimensions of the need for cognition: Subscales and gender difference', *Mutlivariate Behavioural Research* vol 23, pp. 35-50.

Tedeschi, J. T., Schlenker, B. R., & Bonoma, T. V. (1971). 'Cognitive dissonance: Private ratiocination or public spectacle?' *American Psychologist* vol 26, pp. 680-695.

Testik, M.C., Runger, G.C., Kirkman-Liff, B., Smith, E.A. (2005) 'Data mining and knowledge discovery in healthcare organizations: A decision-tree approach', In Gupta, J., and Sharma, S., (eds) *Creating knowledge-Based Healthcare Organizations*, Idea Group, London.

Thompson, E. P., Chaiken, S., Hazlewood, J.D. (1993). 'Need for cognition and desire for control as moderators of extrinsic reward effects: A Person × situation approach to the study of intrinsic motivation', *Journal of Personality and Social Psychology, vol* 64(6), pp. 987-999.

Thomson, A., Storey, J., Mabey, C., Gray, C., Farmer, E., Thomson, R. (1998). *Management development. The views of the membership of the association of MBAs*, Association of MBAs, London.

Thyer, B. A. (1995). 'Promoting an empiricist agenda within the human services: An ethical and humanistic imperative', *Journal of Behavioural Therapy and Experiential. Psychiatry*, vol 26(2), pp. 93-98.

Tidwell, P. S., Sadowski, C.J., Cyril, J., Pate, L.M. (2000). 'Relationship between need for cognition, knowledge and verbal ability,' *Journal of Psychology*, vol 134(6), pp. 634-655.

UKCC (1993). *Code of professional conduct*, United Kingdom Central Council for Nursing Midwifery and Health Visiting, London.

Ulleberg, P., Rundmo, T. (2003). 'Personality, attitudes and risk perception as predictors of risky driving behaviour among young drivers', *Safety Science*, vol 41(5), pp. 427-444.

Vakkari, P. (1999). 'Task complexity, problem structure and information actions. Integrating studies on information seeking and retrieval', *Information Processing and Management, vol* 35, pp. 819-837.

Veeramah (1995). 'A study to identify the attitudes and needs of qualified staff concerning the use of research findings in clinical practise with mental health care settings', *Journal of advanced Nursing*, vol 22, pp. 855-861.

Vigoda, E. (2000). 'Internal politics in public administration systems: An empirical examination of the relationship with job congruence, organizational citizenship behaviour, and in-role performance', *Public Personnel Management, vol* 29(2), pp. 185-210.

Vigoda, E. (2000). 'Organizational politics, job attitudes, and work outcomes: Exploration and implications for the public sector', *Journal of Vocational Behavior, vol* 57(3), pp. 326-347.

Voyer, J. J. (1994). 'Coercive organizational politics and organizational outcomes: An interpretive study', *Organization Science*, vol 5(1), pp. 72-86.

Vroom, V. (1964). *Work and Motivation*, Wiley and Sons, New York.

Wahle, A.E. Groothuis, W.A. (2005). 'How to handle knowledge management in healthcare: A description of a model to deal with the current and ideal situation."' In Gupt, J., Sharma, S., (eds) *Creating knowledge-Based Healthcare Organizations.* Idea Group, London.

Walshe, K. Rundall., T.G. (2001). 'Evidence-based management: from theory to practise in health care', *'The Milbank Quarterly*, vol 3, pp. 429-58.

Walton, R. E. (1985). 'From control to commitment in the workplace', *Harvard Business Review, vol* 63(2), pp. 77-84.

Waters, L. K., Zakrajsek, T (1990). 'Correlates for need for cognition total subscale scores', *Education and Psychology Measurement*, vol 50, pp. 213-217.

Watson, G., Glaser, E.M. (1980). *Critical thinking appraisal manual*, The Psychological Corporation, Harcourt Brace Jovanovich, Inc, New York.

Webber, D. J. (1991). 'The distribution and use of policy knowledge in the policy process', *Knowledge and Policy*, vol 4(4), pp. 6-36.

Weick, K. (1995). *Sense making in Organizations, Sage,* London.

Weick, K.E. (2001). *Making sense of the organization*, Blackwell Publishing Ltd, Oxford.

Weiss, C. H. (1977). 'Research for policy's sake: the enlightenment function of social research', *Policy Analysis*, vol 3, pp. 531-545.

Weiss, M. J., Bucuvalas, C.H. (1980). *Social science research and decision making*, Columbia University Press, New York.

Wentworth, N., Witryol, S.L. (1990). 'Information theory and collative motivation: Incentive value of uncertainty, variety and novelty for children', *Geriatric, Social and General Psychology, vol* 16(3), pp. 301-22.

West, M., Shackleton, V.J., Hardy, G.E., Dawson, J.F. (2004) *'Work role characteristics, job security and individual innovation at work'*, paper RP0409. Aston Business School Research Paper. Available from http://www.abs.aston.ac.uk. Accessed December 2004.

Wicker, E. (1969). 'Attitudes versus actions: The relationship of verbal and overt behavioural responses to attitude objects', *Journal of Social Issues*, vol 25, pp. 41-78.

Wicklund, R. A., Brehm, J. W. (1976). *Perspectives on Cognitive Dissonance*., Erlbaum, Hillsdale, New Jersey.

Wilson, T.D. (2002) 'The nonsense of 'knowledge management', *Information Research, vol* 8(1), paper number 144.

Win, K. T., Croll, P., (2005). 'Engineering dependable health information systems.' in Gupta, J., Sharma, S., (eds) *Creating knowledge-Based Healthcare Organizations,* Idea Group, London.

Wong, C., Law K.S. (1998). 'Laying the groundwork for a new generation of policy research', *Educational Administration Quarterly, vol* 34(1), pp. 141-147.

Wong, C., Law K.S. (1999). 'Testing reciprocal relations by nonrecursive structural equation models using cross –sectional data', *Organisational Research Methods, vol* 2(1), pp. 69-87.

Yang-Wallentin, F., Schmidt, P., Davidov, E., Bamberg, S. (2004). 'Is there any interation effect between intention and perceived behavioural control?', *Methods of Psychological Research Online, vol* 8(2), pp. 127-157.

Zaltman, D., LeMasters, K., Heffring, M. (1982), *Theory construction in marketing: Some thoughts on thinking,* John Wiley and Sons, New York.

Zanna, M. P., & Cooper, J. (1974). 'Dissonance and the pill: An attribution approach to studying the arousal properties of dissonance', *Journal of Personality and Social Psychology, vol* 29, pp. 703-709.

Zanna, M. P., Cooper, J. (1976). 'Dissonance and the attribution process.' In Ickes, W.J., Kidd, R.F., Hillsdale, R.F, &Lawrence, (eds) *New directions and the attribution research,* Lawrence Erlbaum Associates, New Jersey. pp. 199-217.

Zucker, L. G. (1977). 'The role of institutionalization in cultural persistence', *American Sociological Review, vol* 42, pp. 726-743.

Appendix A Disturbance term settings

The figures represent the way in which the variances associated with the disturbance terms of those variables where the items were parcelled, were fixed. In effect, it takes into account the measurement error associated with the scale, even when there is only a single indicator.

	All
NCS	2.35
Attitude to research	2.5
Research utilisation	.816
Team Utilisation	.75
Critical Skills	1.67
Research seeking	3.25
Decision type	1.65
Improvements	.879
Extrinsic PBC	1.3
Climate	

	Clinical Mgrs	Non-clinical Mgrs
NCS	2.42	2.27
Attitude to research	2.55	2.52
Research utilisation	.845	.81
Team Utilisation	.69	.79
Critical Skills	1.19	1.088
Research seeking	2.99	2.33
Decision type	1.578	1.535
Improvements	.845	.81
Extrinsic PBC	1.24	1.36
Climate	1.3	1.2

	High CPD	Low CPD
NCS	2.21	2.22
Attitude to research	2.63	2.66
Research utilisation	.814	.82
Team Utilisation	.66	.86
Critical Skills	1.179	1.067
Research seeking	2.9	3.44
Decision type	1.64	.907
Improvements	.8	.8
Extrinsic PBC	1.29	1.32
Climate	1.16	1.35

	High Grade	Low Grade
NCS	2.38	2.32
Attitude to research	2.72	2.26
Research utilisation	.816	.819
Team Utilisation	.72	.78
Critical Skills	1.02	1.22
Research seeking	3.02	3.406
Decision type	1.68	1.43
Improvements	.765	1.0
Extrinsic PBC	1.2	1.37
Climate	1.19	1.4

Appendix B

Testing for Multicollinearity

If the absolute values of any of the correlations exceed .85 then the two variables may be redundant (as they are essentially measuring the same thing).

Multicollinearity at a multivariate level is not so straightforward to detect. Tolerance and variance inflation factor scores can assist in this respect. Both tests were employed.

1. Tolerance – which equals 1 minus squared multiple correlation between a variable and all the rest. Tolerance values less than 10% may indicate Multicollinearity
2. Variance Inflation Factor (VIF) The VIF is the ratio of a variable's total variance in standardised terms, to its unique variance. If the first is more than 10 times greater than the second the variables may be redundant.

Dependent variables and their predictors (direct and indirect)

Research utilisation
Attitude to research
Strategic Decision Making
Political research utilisation

1. Research utilisation

Predictor variables (separate items were included in the regression)

- Need for complexity
- Attitude to research
- Team use
- Encouraged
- Threatening and demanding management style
- Promotion

Rewarded

Time/Access/Authority

Climate

Improvements

Skills

Education

Aspirations

Table 9.1 Dependent variables and their predictors. Research Utilisation

		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.307	.763		-.402	.688		
	SMEAN(NCI1)	9.301E-02	.072	.044	1.288	.199	.646	1.548
	SMEAN(NCI3)	-.121	.077	-.052	-1.578	.115	.682	1.467
	SMEAN(NCI11)	-4.138E-02	.078	-.017	-.529	.597	.685	1.460
	SMEAN(NCI14)	.116	.071	.054	1.632	.104	.692	1.446
	SMEAN(TIME1)	6.776E-02	.086	.029	.784	.434	.549	1.821
	SMEAN(ACCESS)	-.106	.102	-.039	-1.043	.298	.547	1.829
	SMEAN(AUTHORIT)	.162	.090	.060	1.813	.071	.686	1.459
	SMEAN(RESEAR1)	.390	.080	.174	4.886	.000	.593	1.686
	SMEAN(RESEAR4)	.200	.069	.095	2.884	.004	.692	1.446
	SMEAN(RESEAR5)	.337	.081	.133	4.164	.000	.734	1.362
	SMEAN(RESEAR8)	-1.174E-02	.076	-.005	-.155	.877	.789	1.268
	SMEAN(B16)	.381	.104	.143	3.682	.000	.500	2.000
	SMEAN(B18)	.282	.104	.110	2.708	.007	.458	2.182
	SMEAN(B21)	.741	.115	.262	6.439	.000	.453	2.210
	SMEAN(DECIS5)	.143	.060	.073	2.393	.017	.799	1.252

	SMEAN(RESEAR2)	-.125	.068	-.056	-1.857	.064	.825	1.212
	SMEAN(ENCOURA1)	.172	.092	.069	1.882	.061	.558	1.794
	SMEAN(REWARD1)	-.196	.090	-.075	-2.173	.030	.624	1.603
	SMEAN(CLIMATE1)	-6.488E-02	.083	-.027	-.784	.434	.614	1.630
	SMEAN(CLIMATE2)	7.682E-02	.084	.030	.918	.359	.687	1.456
	SMEAN(CLIMATE3)	-8.508E-02	.080	-.035	-1.069	.286	.719	1.391
	SMEAN(CLIMATE5)	-.125	.070	-.060	-1.786	.075	.659	1.518
	SMEAN(CLIMATE6)	1.143E-02	.084	.005	.136	.892	.536	1.867
	SMEAN(CLIMATE7)	4.485E-02	.082	.019	.550	.583	.600	1.666
	SMEAN(CLIMAT11)	8.477E-02	.079	.036	1.079	.281	.685	1.461
	SMEAN(CLIMAT12)	-.149	.087	-.063	-1.716	.087	.564	1.774
	SMEAN(CLIMAT15)	-4.069E-02	.075	-.018	-.541	.589	.660	1.515
	SMEAN(CLIMAT17)	7.393E-02	.089	.031	.829	.408	.528	1.894
	SMEAN(CLIMAT19)	1.991E-03	.077	.001	.026	.979	.590	1.694
	SMEAN(ADOPT3)	-.118	.075	-.058	-1.577	.116	.557	1.796
	SMEAN(IMPORVE3)	.206	.125	.117	1.656	.099	.151	6.642
	SMEAN(IMPROVE4)	.170	.131	.097	1.302	.194	.136	7.346
	SMEAN(IMPROVE5)	-1.329E-02	.114	-.007	-.117	.907	.189	5.302
	SMEAN(IMPROVE7)	.129	.113	.071	1.141	.255	.192	5.217
	SMEAN(SKILLS1)	-2.318E-02	.112	-.010	-.207	.836	.298	3.356

	SMEAN(SKILLS4)	.157	.092	.066	1.704	.089	.506	1.976
	SMEAN(SKILLS6)	5.877E-02	.101	.028	.580	.562	.329	3.044
	SMEAN(SKILLS7)	1.065E-02	.112	.005	.095	.924	.285	3.503
	SMEAN(SKILLS8)	4.943E-02	.111	.022	.444	.657	.316	3.164
	SMEAN(EDUCATIO)	-1.715E-02	.037	-.014	-.464	.643	.787	1.271
	SMEAN(ASP1)	.178	.082	.072	2.164	.031	.683	1.464

a Dependent Variable: PARINDUS

Aside from the items related to perceived improvements, the values of tolerance are acceptable, suggesting that we are not experiencing problems of multicollinearity.

It would be difficult to argue that we are dealing with separate factors – essentially we appear to be measuring whether or not people have experienced improvements in their work – respondents are not distinguishing between different aspects of their work in which these improvements have occurred.

These items formed one parcel and the regression analysis was repeated:-

		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.348	.761		-.458	.648		
	SMEAN(NCI1)	8.347E-02	.071	.039	1.169	.243	.659	1.518
	SMEAN(NCI3)	-.112	.076	-.048	-1.470	.142	.690	1.450
	SMEAN(NCI11)	-4.268E-02	.078	-.018	-.547	.585	.687	1.456
	SMEAN(NCI14)	.119	.071	.055	1.681	.094	.693	1.444
	SMEAN(TIME1)	6.347E-02	.085	.027	.746	.456	.565	1.770
	SMEAN(ACCESS)	-9.807E-02	.101	-.036	-.973	.331	.553	1.809
	SMEAN(AUTHORIT)	.146	.088	.054	1.661	.098	.707	1.415
	SMEAN(RESEAR1)	.372	.078	.166	4.747	.000	.615	1.627
	SMEAN(RESEAR4)	.193	.069	.092	2.811	.005	.703	1.422
	SMEAN(RESEAR5)	.330	.081	.130	4.097	.000	.738	1.356
	SMEAN(RESEAR8)	-2.044E-03	.075	-.001	-.027	.978	.798	1.254
	SMEAN(B16)	.381	.103	.143	3.689	.000	.500	1.999
	SMEAN(B18)	.284	.104	.110	2.740	.006	.460	2.174
	SMEAN(B21)	.734	.114	.260	6.434	.000	.458	2.183
	SMEAN(DECIS5)	.138	.059	.071	2.328	.020	.808	1.237
	SMEAN(RESEAR2)	-.118	.067	-.053	-1.759	.079	.831	1.203
	SMEAN(ENCOURA1)	.188	.090	.075	2.103	.036	.580	1.724

SMEAN(REWARD1)	-.189	.090	-.072	-2.098	.037	.627	1.595
SMEAN(CLIMATE1)	-5.496E-02	.082	-.023	-.669	.504	.620	1.612
SMEAN(CLIMATE2)	8.063E-02	.083	.032	.968	.334	.690	1.450
SMEAN(CLIMATE3)	-7.827E-02	.079	-.032	-.995	.320	.733	1.364
SMEAN(CLIMATE5)	-.134	.069	-.065	-1.957	.051	.680	1.471
SMEAN(CLIMATE6)	1.809E-02	.083	.008	.217	.828	.538	1.858
SMEAN(CLIMATE7)	3.777E-02	.081	.016	.468	.640	.611	1.636
SMEAN(CLIMAT11)	8.483E-02	.078	.036	1.083	.280	.685	1.459
SMEAN(CLIMAT12)	-.151	.086	-.064	-1.752	.081	.565	1.771
SMEAN(CLIMAT15)	-3.483E-02	.075	-.016	-.465	.642	.665	1.505
SMEAN(CLIMAT17)	7.106E-02	.089	.030	.799	.425	.530	1.888
SMEAN(CLIMAT19)	2.231E-03	.077	.001	.029	.977	.594	1.685
SMEAN(SKILLS1)	-1.594E-02	.111	-.007	-.144	.886	.302	3.307
SMEAN(SKILLS4)	.144	.091	.060	1.579	.115	.518	1.932
SMEAN(SKILLS6)	6.258E-02	.101	.029	.620	.536	.330	3.031
SMEAN(SKILLS7)	1.187E-02	.112	.005	.106	.915	.286	3.494
SMEAN(SKILLS8)	5.680E-02	.111	.025	.512	.609	.317	3.152
SMEAN(EDUCATIO)	-1.716E-02	.037	-.014	-.466	.642	.789	1.267
SMEAN(ASP1)	.183	.082	.074	2.248	.025	.694	1.441
PARCIMP	.125	.019	.265	6.485	.000	.449	2.228

a Dependent Variable: PARINDUS

The variance inflation factor is the reciprocal of tolerance. Variables with low tolerances have large variance inflation factors. VIF should be 4 or less (Hutcheson and Sofronious,1999, say 5), or there is a multicollinearity problem. These cut-offs are, of course, rules of thumb. In the above table, 3.49 if the highest VIF score, and so we do not appear to have to deal with problems of muticollinearity (accepting that the items measuring 'perceived improvements' specifically, will need to be combined as there are concerns arising from the use of this particular scale.

2. Attitude to research

We would, of course expect to see a similar picture when we consider attitude to research as the dependent variable:-

Table 9.2 Dependent variables and their predictors. Attitude to Research

Coefficients

		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.358	.342		6.900	.000		
	SMEAN(NCI1)	2.438E-03	.032	.001	.076	.940	.654	1.528
	SMEAN(NCI3)	-1.436E-02	.034	-.005	-.420	.675	.685	1.460
	SMEAN(NCI11)	1.527E-02	.035	.005	.431	.667	.669	1.494

SMEAN(NCI14)	-2.047E-03	.032	-.001	-.064	.949	.678	1.475
SMEAN(TIME1)	-8.022E-02	.038	-.026	-2.095	.037	.561	1.781
SMEAN(ACCESS)	-1.951E-02	.045	-.005	-.431	.667	.551	1.814
SMEAN(AUTHORIT)	4.704E-02	.040	.013	1.181	.238	.695	1.439
SMEAN(RESEAR1)	1.097	.036	.377	30.300	.000	.578	1.731
SMEAN(RESEAR4)	1.073	.031	.393	34.075	.000	.674	1.483
SMEAN(RESEAR5)	1.065	.037	.325	28.720	.000	.700	1.428
SMEAN(RESEAR8)	1.205	.034	.379	35.667	.000	.793	1.262
SMEAN(B16)	-4.427E-02	.053	-.013	-.835	.404	.382	2.615
SMEAN(B18)	.143	.053	.043	2.668	.008	.349	2.869
SMEAN(B21)	-.168	.067	-.046	-2.514	.012	.270	3.699
SMEAN(DECIS5)	-3.675E-02	.027	-.015	-1.358	.175	.785	1.274
SMEAN(RESEAR2)	-3.593E-02	.030	-.012	-1.187	.236	.823	1.216
SMEAN(ENCOURA1)	3.116E-02	.040	.010	.771	.441	.572	1.747
SMEAN(REWARD1)	-2.106E-02	.041	-.006	-.519	.604	.619	1.616
SMEAN(CLIMATE1)	-1.900E-02	.037	-.006	-.515	.607	.618	1.617
SMEAN(CLIMATE2)	6.002E-02	.038	.018	1.600	.110	.685	1.461
SMEAN(CLIMATE3)	1.685E-02	.035	.005	.477	.634	.730	1.370
SMEAN(CLIMATE5)	1.308E-03	.031	.000	.042	.966	.670	1.493
SMEAN(CLIMATE6)	-9.460E-02	.038	-.033	-2.519	.012	.533	1.875
SMEAN(CLIMATE7)	1.519E-02	.036	.005	.418	.676	.608	1.645

SMEAN(CLIMAT11)	-2.371E-02	.035	-.008	-.674	.501	.683	1.464
SMEAN(CLIMAT12)	-1.807E-02	.039	-.006	-.465	.643	.559	1.787
SMEAN(CLIMAT15)	-6.256E-02	.034	-.022	-1.863	.063	.664	1.506
SMEAN(CLIMAT17)	5.248E-02	.040	.017	1.306	.192	.521	1.919
SMEAN(CLIMAT19)	2.775E-03	.034	.001	.081	.936	.592	1.690
SMEAN(SKILLS1)	2.389E-02	.050	.008	.479	.632	.301	3.323
SMEAN(SKILLS4)	1.487E-03	.041	.000	.036	.971	.512	1.953
SMEAN(SKILLS6)	-1.284E-02	.045	-.005	-.283	.777	.329	3.036
SMEAN(SKILLS7)	-2.783E-03	.050	-.001	-.055	.956	.285	3.505
SMEAN(SKILLS8)	-1.721E-02	.050	-.006	-.346	.730	.316	3.162
SMEAN(EDUCATIO)	3.873E-02	.017	.025	2.337	.020	.784	1.276
SMEAN(ASP1)	-2.287E-02	.037	-.007	-.621	.535	.684	1.462
PARCIMP	1.235E-02	.009	.020	1.349	.178	.401	2.494
SMEAN(A16)	-3.821E-04	.053	.000	-.007	.994	.367	2.728
SMEAN(A18)	-1.159E-02	.058	-.004	-.199	.843	.271	3.695
SMEAN(A21)	.139	.060	.041	2.308	.022	.287	3.483

a Dependent Variable: PARCATT

3. Strategic Decision-Making

Here, I considered both the direct and indirect predictors of strategic decision-making:-

Table 9.3 Dependent variables and their predictors. Decision-Making

All predictors direct and indirect:-

Coefficients

		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	6.652	1.219		5.455	.000		
	SMEAN(NCI1)	.199	.117	.087	1.694	.091	.650	1.537
	SMEAN(NCI3)	.177	.124	.071	1.427	.154	.693	1.443
	SMEAN(NCI11)	.212	.129	.083	1.646	.101	.673	1.485
	SMEAN(NCI14)	-8.469E-03	.116	-.004	-.073	.942	.685	1.461
	SMEAN(RESEAR1)	.269	.131	.111	2.046	.042	.583	1.714
	SMEAN(RESEAR4)	1.928E-02	.113	.008	.171	.864	.701	1.426
	SMEAN(RESEAR5)	-.341	.133	-.125	-2.557	.011	.719	1.392
	SMEAN(RESEAR8)	-5.212E-02	.121	-.020	-.432	.666	.826	1.210

	SMEAN(B16)	9.085E-02	.191	.031	.477	.634	.393	2.546
	SMEAN(B18)	5.986E-02	.194	.022	.308	.758	.350	2.854
	SMEAN(B21)	1.243E-02	.240	.004	.052	.959	.276	3.623
	SMEAN(RESEAR2)	-4.838E-02	.110	-.020	-.441	.660	.831	1.204
	SMEAN(ENCOURA1)	-3.718E-02	.146	-.014	-.254	.799	.581	1.720
	SMEAN(REWARD1)	.114	.143	.041	.801	.424	.661	1.512
	SMEAN(CLIMATE1)	1.097E-02	.129	.004	.085	.932	.670	1.492
	SMEAN(CLIMATE2)	6.994E-02	.137	.026	.512	.609	.685	1.460
	SMEAN(CLIMATE3)	-9.394E-02	.128	-.035	-.735	.463	.741	1.350
	SMEAN(CLIMATE5)	-.144	.112	-.064	-1.282	.201	.680	1.470
	SMEAN(CLIMATE6)	.193	.136	.080	1.413	.159	.537	1.862
	SMEAN(CLIMATE7)	-.159	.131	-.064	-1.209	.228	.617	1.620
	SMEAN(CLIMAT11)	-.216	.128	-.084	-1.685	.093	.683	1.465
	SMEAN(CLIMAT12)	.116	.141	.045	.825	.410	.565	1.770
	SMEAN(CLIMAT15)	1.411E-02	.123	.006	.115	.908	.661	1.513
	SMEAN(CLIMAT17)	-1.622E-03	.146	-.001	-.011	.991	.527	1.896
	SMEAN(CLIMAT19)	-9.692E-02	.125	-.042	-.777	.438	.600	1.668
	SMEAN(SKILLS1)	.108	.180	.045	.603	.547	.309	3.240
	SMEAN(SKILLS4)	-.371	.149	-.143	-2.482	.014	.513	1.949
	SMEAN(SKILLS6)	.148	.165	.065	.900	.369	.330	3.030
	SMEAN(SKILLS7)	9.989E-02	.183	.042	.547	.585	.286	3.498

	SMEAN(SKILLS8)	-.105	.180	-.043	-.584	.559	.320	3.123
	SMEAN(EDUCATIO)	.317	.060	.246	5.255	.000	.783	1.277
	SMEAN(ASP1)	.212	.132	.079	1.603	.110	.702	1.424
	PARCIMP	8.420E-02	.032	.165	2.640	.009	.438	2.281
	SMEAN(A16)	.113	.193	.040	.587	.558	.368	2.715
	SMEAN(A18)	1.145E-02	.211	.004	.054	.957	.275	3.641
	SMEAN(A21)	-3.263E-02	.219	-.011	-.149	.881	.291	3.435
	SMEAN(DECIS5)	-1.758E-02	.099	-.008	-.178	.858	.786	1.273
	SMEAN(GRADE)	.543	.109	.228	4.989	.000	.821	1.218

a Dependent Variable: DECTYPE

Direct Predictors only:-

		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.292	.865		6.116	.000		
	SMEAN(NCI1)	.227	.113	.099	2.010	.045	.713	1.402
	SMEAN(NCI3)	.121	.120	.049	1.010	.313	.756	1.323
	SMEAN(NCI11)	.236	.123	.092	1.910	.057	.746	1.341

	SMEAN(NCI14)	-2.378E-02	.114	-.010	-.209	.834	.728	1.373
	SMEAN(EDUCATIO)	.331	.057	.256	5.811	.000	.896	1.116
	SMEAN(ASP1)	.275	.123	.102	2.227	.027	.824	1.214
	PARCIMP	8.754E-02	.029	.172	3.010	.003	.537	1.863
	SMEAN(A16)	.151	.164	.053	.921	.358	.520	1.924
	SMEAN(A18)	-3.645E-02	.172	-.014	-.212	.832	.422	2.370
	SMEAN(A21)	2.486E-02	.163	.009	.152	.879	.531	1.884
	SMEAN(GRADE)	.516	.104	.217	4.952	.000	.910	1.099
	SMEAN(DECIS5)	-2.975E-02	.091	-.014	-.328	.743	.945	1.058

a Dependent Variable: DECTYPE

As expected, we are not dealing with problems of multicollinearity

4. Political research utilisation

Table 9.4 Dependent variables and their predictors. Political Use of Research Evidence

Coefficients

		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
Model		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.627	.521		1.204	.229		
	SMEAN(CLIMATE1)	4.195E-02	.059	.028	.713	.476	.690	1.449
	SMEAN(CLIMATE2)	-8.585E-02	.061	-.054	-1.409	.160	.736	1.359

	SMEAN(CLIMATE3)	-3.330E-02	.058	-.022	-.577	.565	.776	1.289
	SMEAN(CLIMATE5)	-4.345E-02	.052	-.034	-.843	.400	.689	1.452
	SMEAN(CLIMATE6)	6.394E-02	.062	.046	1.028	.305	.552	1.813
	SMEAN(CLIMATE7)	.143	.060	.099	2.373	.018	.625	1.601
	SMEAN(CLIMAT11)	-4.004E-02	.059	-.027	-.683	.495	.698	1.432
	SMEAN(CLIMAT12)	1.765E-02	.064	.012	.274	.784	.580	1.723
	SMEAN(CLIMAT15)	5.629E-02	.054	.040	1.034	.302	.716	1.396
	SMEAN(CLIMAT17)	1.308E-02	.066	.009	.199	.843	.551	1.814
	SMEAN(CLIMAT19)	-4.515E-02	.057	-.033	-.791	.429	.612	1.635
	SMEAN(DECIS5)	-8.815E-02	.046	-.072	-1.933	.054	.784	1.275
	SMEAN(B17)	.624	.066	.386	9.477	.000	.657	1.523
	SMEAN(B19)	.779	.061	.503	12.683	.000	.696	1.438
	SMEAN(A16)	.138	.089	.084	1.558	.120	.374	2.671
	SMEAN(A18)	5.010E-02	.094	.032	.531	.595	.294	3.396
	SMEAN(A21)	-3.157E-02	.100	-.019	-.317	.752	.300	3.336
	SMEAN(B16)	-.185	.088	-.111	-2.108	.036	.397	2.518
	SMEAN(B18)	.178	.090	.110	1.983	.048	.352	2.839
	SMEAN(B21)	.137	.109	.078	1.255	.210	.285	3.514
	SMEAN(RESEAR1)	-.146	.059	-.104	-2.454	.015	.609	1.643
	SMEAN(RESEAR4)	-1.483E-02	.053	-.011	-.282	.778	.686	1.459
	SMEAN(RESEAR5)	-4.729E-02	.061	-.030	-.780	.436	.744	1.345

	SMEAN(RESEAR8)	-7.766E-02	.055	-.051	-1.418	.157	.856	1.168
	SMEAN(NCI1)	-4.580E-02	.053	-.035	-.870	.385	.691	1.448
	SMEAN(NCI3)	6.765E-02	.056	.047	1.198	.232	.714	1.401
	SMEAN(NCI11)	-7.296E-03	.058	-.005	-.126	.900	.712	1.404
	SMEAN(NCI14)	7.489E-02	.053	.056	1.416	.158	.707	1.414

a Dependent Variable: INDPOLUS

Again, the tests show that there does not appear to be a concern about multicollinearity when considering the outcome variable 'political use of research utilisation by the individual.'

Appendix C

Glossary of terms

Bollen-Stine bootstrap: Bootstrapping is a way of estimating standard error and significance based not on assumptions of normality but on empirical re-sampling with replacement of the data. Taking a large number of random samples from the dataset generates information on the variability of parameter estimates or of fit indices based on the empirical samples, not on assumptions about probability theory of normal distributions. Bollen-Stine is a bootstrap modification of model chi-square, used to test model fit. If Bollen-Stine bootstrap $p < .05$, the model is rejected.

Common method variance: Variables may appear to be related because they were measured via the same method. When self-reports are used to gather data there is the danger that the method employed is the reason for obtaining significant results, absent any true effects. It is important to perform Harman's one-factor test as one way to attempt to minimise common method bias.

Correlated error terms: The residuals, or disturbance terms, of endogenous variables in the model are allowed to co-vary. This suggests that the variables have a common cause (or causes) that are not explicitly modelled.

Disturbance terms: The set of unspecified causes of the effect variable. Analogous to an error or residual in a prediction equation. Usually each endogenous variable has a disturbance.

Endogenous variable: A variable that is caused by one or more variable in the model. Note that an endogenous variable may also cause another endogenous variable in the model.

Factor loadings: Estimates of direct effects in path models are known as path coefficients or regression weights, the corresponding term in factor analysis for such estimates is factor loadings.

Identification: A model is said to be identified if there exists a unique solution for the model's parameters. If there is no unique solution, then the model is of little value. The number of known values must equal or exceed the number of free parameters in the model. All identified models meet this rule, and if the rule is not met the model is not identified.

Item parcels: Item scores are averaged or summed to represent the variable, rather than using all of the items in the instrument in the structural model.

Latent variables: Variable in the model that are not directly measured. Often also referred to as factors or constructs.

Listwise and pairwise deletion: Among the most common techniques used to deal with item non-responses are listwise and pairwise deletion. In listwise deletion, if any variable for a case is missing information, the entire case is omitted from the analysis. Like listwise deletion, pairwise deletion uses only complete case data. The difference is that in pairwise deletion, only the cases with non-missing values for the two variables under comparison are considered.

Maximum likelihood (ML) estimation: The aim of maximum likelihood estimation is to find the parameter value(s) that makes the observed data most likely. There are frequently many parameters to be estimated at once in a general function. We must discover the estimates for all the parameters that simultaneously maximise the likelihood.

Just-identified: An identified model in which the number of free parameters exactly equals the number of known values; a model with zero degrees of freedom.

Nonrecursive: Nonrecursive models are those that have feedback loops, which indicates a reciprocal relationship between the variables in the model. The term "recursive" refers to the process for estimating the model's parameters. In a recursive model, the parameters can be estimated using a stepwise approach, moving forward from the causally prior equation to the latter equations. This approach is recursive as the process of estimating later parameters refers back to parameters previously estimated. This stepwise approach fails where the model is nonrecursive; i.e. where there are reciprocal relationships between the variables or correlated structural errors.

Over-identified model: A model for which all the parameters are identified and for which there are more knowns than free parameters. An over-identified model places constraints on the correlation or covariance matrix, and it is possible to find a unique solution for such models.

Path analysis: Path analysis is a possible technique for when there is only a single observed measure of each theoretical variable in the model, and the researcher wishes to test the causal relations between these variables.

R-square: This figure tells one how much of the variance in the dependent variable is explained by the model. Within SEM, the squared multiple correlation (SMC) value also represents the proportion of variance that is explained by the predictors of the variable in question.

Appendix D: The Questionnaire

(To be attached)

Appendix 1).

questionnaire explores the impact both of individual preferences and organisational climate on [...]ation use. It will take around 20 minutes to complete. If you are unable to answer any of the questions move straight on to the next one. All replies are treated in strictest confidence, so please be as open and [...]t as possible in your responses.

Your job title?

Does your role involve clinical management?

Yes ☑ No ☐

Please indicate which of the following educational levels you have attained (tick all that apply):

- Secondary education ☐
- National certificate / diploma ☐
- Higher National diploma ☐
- N/SVQ 1-3 ☐
- N/SVQ 4-5 ☐
- Degree ☑
- Postgraduate degree, diploma ☑
- Masters degree ☑
- Doctorate ☐
- Other (please state) ☐

Are you a clinical practitioner?

Yes ☐ No ☑

How would you describe your grade?

- Director (board level) ☑
- Senior manager ☐
- Middle Manager ☐
- Junior Manager ☐
- Non manager ☐

[...] general terms, how often are the decisions that you must make in your job?

	Always	Frequently	Occasional-ly	Rarely	Never
Made within existing policies and guidelines	☐	☐	☐	☑	☐
Complex, with many factors which must be taken into account	☐	☑	☐	☐	☐
Dependent upon the perspectives and 'buy-in' of many stakeholders	☐	☑	☐	☐	☐
High risk	☐	☑	☐	☐	☐
Routine, only rarely does something new come up	☐	☐	☐	☐	☑

Please state the number of years you have worked:-

In your current post? 6

In this work area? 11

Approximately how much time do you spend on formal and informal professional development activities in an average year? (please tick one box only)

- None ☐
- 2-3 days ☐
- 4-6 days ☐
- 7-10 days ☑
- 11-15 days ☐
- 16 days and over ☐

Have you undertaken a Critical Appraisal Skills Programme (CASP)

Yes ☑ No ☐

Q10 **Please rate your level of agreement with the following statements as they relate to your immediate work environment.**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
	5	4	3	2	1
There is widespread support and acceptance of our purpose and goals	☐	☑	☐	☐	☐
I do not understand how our goals and purpose are to be achieved	☐	☐	☐	☐	☑
We have identified values to which we must all conform	☐	☑	☐	☐	☐
We have opportunities for self assessment with respect to goal achievement	☐	☑	☐	☐	☐
Senior managers and professionals resist change and are afraid of new ideas	☐	☐	☐	☑	☐
Senior managers and professionals share a common vision with all staff about what our work should accomplish	☐	☐	☑	☐	☐
Managers and professional staff can accept criticism without becoming overly defensive	☐	☐	☑	☐	☐
Managers and professional staff provide useful feedback that helps to identify potential problems and opportunities	☐	☑	☐	☐	☐
Managers and professional staff frequently involve less senior staff in important decisions	☐	☑	☐	☐	☐
I can often bring new ideas into the workplace	☐	☑	☐	☐	☐
From my experience, people who are new here are encouraged to question the way things are done	☑	☐	☐	☐	☐
Managers and professional staff encourage less senior people to experiment in order to improve work processes	☐	☑	☐	☐	☐
Innovative ideas that work are often rewarded	☐	☑	☐	☐	☐
In my experience, new ideas from less senior staff are not treated seriously	☐	☐	☐	☑	☐
I often have the opportunity to talk to colleagues about successful programmes or work activities to understand why they succeed	☐	☑	☐	☐	☐
Failures are seldom constructively discussed here	☐	☐	☐	☑	☐
New work processes that may be useful to other parts of the organisation are usually shared	☐	☐	☑	☐	☐
We have a system that allows us to learn successful practices from other parts of the organisation	☐	☐	☐	☑	☐
We have a system that allows us to learn successful practices from other organisations	☐	☐	☐	☑	☐
Current practice encourages staff to solve problems together before escalating the issue	☑	☐	☐	☐	☐
We cannot usually form informal groups to solve organisational problems	☐	☐	☐	☐	☑
Most problem solving groups here feature employees from a variety of functional backgrounds	☐	☑	☐	☐	☐

Q11 **Please state your level of agreement with the following questions:**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongl disagre
My aspirations are very high in regard to professional recognition and achievement	☐	☑	☐	☐	☐
I would like to be in a position of greater influence in the organisation	☐	☐	☐	☑	☐
I do not wish to advance to a position of more responsibility	☐	☐	☐	☑	☐
For me the hassles of being in a higher position would outweigh the benefits	☐	☐	☐	☑	☐
I am concerned that others in the organisation should recognise my knowledge and expertise	☐	☑	☐	☐	☐

For each of the statements below, please indicate to what extent the statement is characteristic of you:

	extremely uncharact-eristic	somewhat uncharact-eristic	uncertain	somewhat characteri-stic	extremely characteri-stic
I would prefer complex to simple problem solving	☐	☐	☐	☐	☑
I like to have the responsibility of handling a situation that requires a lot of thinking	☐	☐	☐	☐	☑
Thinking is not my idea of fun	☑	☐	☐	☐	☐
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities	☐	☑	☐	☐	☐
I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something	☑	☐	☐	☐	☐
I find satisfaction in deliberating hard and for long hours	☐	☐	☐	☑	☐
I only think as hard as I have to	☐	☑	☐	☐	☐
I prefer to think about small, daily projects to long terms ones	☐	☑	☐	☐	☐
I like tasks that require little though once I've learned them	☑	☐	☐	☐	☐
The idea of relying on thought to make my way to the top appeals to me	☐	☐	☐	☑	☐
I really enjoy a task that involves coming up with new solutions to problems	☐	☐	☐	☐	☑
Learning new ways to think doesn't excite me very much	☑	☐	☐	☐	☐
I prefer my life to be filled with puzzles that I must solve	☐	☐	☐	☐	☑
The notion of thinking abstractly is appealing to me	☐	☐	☐	☐	☑
I would prefer a task that is intellectual, difficult and important to one that is somewhat important but does not require much thought	☐	☐	☐	☐	☑
I feel relief rather than satisfaction after completing a task that required a lot of mental effort	☐	☑	☐	☐	☐
It's enough for me that something gets the job done, I don't care how or why it works	☑	☐	☐	☐	☐
I usually end up deliberating about issues even when they do not affect me personally	☐	☐	☐	☑	☐

In terms of your own line managers, how do you believe they influence the decision making process when dealing with those they must persuade to their point of view?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
CONSULTATION. (They listen to their concerns and suggestions and are willing to modify their proposals to deal with these)	☐	☑	☐	☐	☐
PERSONAL APPEALS. (They appeal to their colleagues loyalty and friendship)	☐	☑	☐	☐	☐
INGRATIATION. (They use praise, flattery, or are friendly or helpful towards them)	☐	☐	☑	☐	☐
EXCHANGE. (They will indicate a willingness to reciprocate a favour at a later time, or promise a share of the benefits/recognition if the outcome of the decision is good)	☐	☑	☐	☐	☐
PRESSURE (They use demands and threats)	☐	☐	☑	☐	☐
INSPIRATIONAL APPEALS.(They appeal to their values, ideals and aspirations)	☐	☑	☐	☐	☐
RATIONAL PERSUASION. (They use logical arguments and factual evidence to convince their colleagues)	☐	☑	☐	☐	☐
LEGITIMISING TACTICS. (They point to their authority or right to make the decision, and verify that it is consistent with organisational rules.)	☐	☑	☐	☐	☐
COALITION TACTICS. They lobby, and seek the support of others to back them	☐	☐	☑	☐	☐

In the following questions 'research evidence' is defined as information which is obtained from critical investigation and which is claimed to be free of unexamined personal beliefs or political ideology

Q14 **In terms of your present job, please rate your level of agreement with the following statements:-**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Research is not relevant to my real day to day work	☐	☐	☐	☐	☑
Research expertise is taken into account in promotion decisions	☐	☐	☑	☐	☐
Mine should be a research based profession	☐	☐	☑	☐	☐
I am too busy delivering my objectives to spend time reading research	☐	☐	☐	☐	☑
Research often leads to real practical advances in the work of Healthcare Managers	☐	☑	☐	☐	☐
Research expertise is of value to Healthcare Managers	☑	☐	☐	☐	☐
In practice, very few Healthcare Managers use research findings	☐	☑	☐	☐	☐
Research expertise should not be taken into account in promotion decisions for Healthcare Managers	☐	☐	☐	☐	☑
Research is only relevant to Healthcare Management education, not to practice	☐	☐	☐	☐	☑
Most healthcare Managers are aware of relevant research findings	☐	☐	☐	☑	☐
Healthcare Managers are too busy to incorporate research findings into day to day practice	☐	☐	☑	☐	☐
I prefer to make judgements based on my existing knowledge and expertise	☐	☐	☐	☑	☐
I prefer to make judgements based on scientific research evidence with a great deal of detail	☐	☐	☑	☐	☐

Please state how frequently you seek out or request research evidence from the following sources:-

	12 times a year or more	6-12 times a year	1-6 times a year	Less than once a year	Never	Not available
Internet searches	☑	☐	☐	☐	☐	☐
Organisational/professional library	☐	☑	☐	☐	☐	☐
Management/ professional journals	☑	☐	☐	☐	☐	☐
Academic/research journals	☐	☐	☑	☐	☐	☐
Electronic databases (e.g. Medline/Embase)	☐	☐	☑	☐	☐	☐
'Evidence-based' journals (e.g. Bandolier, Evidence-Based Mental Health)	☑	☐	☐	☐	☐	☐
Internal (i.e. organisational) evaluation or research evidence	☑	☐	☐	☐	☐	☐
External best practice guidance or evaluations	☐	☑	☐	☐	☐	☐
Other (please state where) i.	☐	☐	☐	☐	☐	☐
ii.	☐	☐	☐	☐	☐	☐
iii.	☐	☐	☐	☐	☐	☐

Research evidence is translated into significant practical action in the workplace

	Always	Frequently	Occasionally	Rarely	Never
a. By you personally	☐	☐	☑	☐	☐
b. By the team(s) with whom you work	☐	☐	☑	☐	☐
c. Within your organisation	☐	☐	☑	☐	☐

Research evidence is manipulated or ignored in order to justify decisions really made on other grounds

	Always	Frequently	Occasionally	Rarely	Never
a. By you personally	☐	☐	☐	☑	☐
b. By the team(s) with whom you work	☐	☐	☐	☑	☐
c. Within your organisation	☐	☐	☐	☑	☐

Research evidence is used to keep one's professional/managerial knowledge base updated

	Always	Frequently	Occasionally	Rarely	Never
a. By you personally..	☐	☑	☐	☐	☐
b. By the team(s) with whom you work	☐	☑	☐	☐	☐
c. Within the organisation	☐	☑	☐	☐	☐

Research evidence is only used when it suits the needs of those in positions of influence

	Always	Frequently	Occasionally	Rarely	Never
a. By you personally	☐	☐	☐	☑	☐
b. By the team(s) with whom you work	☐	☐	☐	☑	☐
c. Within your organisation	☐	☐	☑	☐	☐

Research evidence is used to help ensure more effective policies and procedures

	Always	Frequently	Occasionally	Rarely	Never
a. By you personally..	☐	☐	☐	☐	☐
b. By the team(s) with whom you work	☐	☑	☐	☐	☐
c. Within the organisation	☐	☑	☐	☐	☐

Research evidence is used to gain a better understanding of work related issues

	Always	Frequently	Occasionally	Rarely	Never
a. By you personally..	☐	☑	☐	☐	☐
b. By the team(s) with whom you work	☐	☑	☐	☐	☐
c. Within the organisation	☐	☑	☐	☐	☐

Please indicate what you believe your skill level to be in the assessment of research papers:-

	Excellent	Good	Fair	Poor	No awareness
Assessing study design	☐	☑	☐	☐	☐
Evaluating bias	☐	☑	☐	☐	☐
Evaluating adequacy of sample size	☐	☑	☐	☐	☐
Evaluating statistical tests.	☐	☐	☑	☐	☐
Assessing generalizability of findings	☐	☑	☐	☐	☐
Literature searching	☐	☑	☐	☐	☐
Research methods (quantitative and qualitative)	☐	☑	☐	☐	☐
Assessing the general worth of a research article	☐	☑	☐	☐	☐

Please rate your agreement with the following statements

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
People are encouraged to use research evidence in their decision making	✓				
People are encouraged to keep up to date with research evidence	✓				
People are recognised and/or rewarded for their awareness and use of research evidence		✓			
If I felt it was worth my while, I could find the time to review research evidence	✓				
If I felt it was worth my while, I could locate and access research evidence	✓				
I have the skills needed to appraise research evidence, if I felt it was worth my while	✓				
I have the authority to use research evidence in my work, if I felt it was worth my while	✓				

Please describe your awareness of evidence-based practice

Excellent		Fair		No awareness	
Good	✓	Poor			

To what extent has an evidence-based approach has been adopted:

	To a great extent	To a considerable extent	To a moderate extent	To a limited extent	To very limited extent	Not at all
By you personally			✓			
By the team(s) with whom you work			✓			
Within your organisation			✓			

Please rate the extent to which evidence-based practice has generated improvements in the following areas.

	To a great extent	To a considerable extent	To a moderate extent	To a limited extent	To very limited extent	Not at all
Your ability to access and review research evidence		✓				
Your understanding of work related problems		✓				
Your confidence in your professional judgement		✓				
Your decision-making			✓			
Your awareness of more possible solutions		✓				
You ability to influence the decision making process		✓				
Your work performance		✓				
Your ability to audit/ evaluate interventions		✓				

Thank you for taking the time to complete this questionnaire. It should be returned to Amanda Harris in the SAE provided. If you are willing to take part in a follow up phone interview please give your contact details on the attached sheet. This will be separated from the questionnaire before the data is input to ensure confidentiality. Questionnaires should be returned BY SEPTEMBER 21st.